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16. ABSTRACT

To obtain additional information on the magnitude and spatial extent of the carbon monoxide problem in Boise, a 20-day study was conducted involving 40 outdoor sites, six indoor sites, and two pedestrian routes. Bag samples were analyzed by an electrochemical oxidation method. Results for one eight-hour period daily (two consecutive four-hour samples) were compared for the outdoor study sites and for the routinely operated permanent monitor in the central business district. → To P.2

The permanent monitor did not represent the highest eight-hour average CO concentration measured during the study period (about 17 ppm), nor the highest frequency of exceedences of the 9.0 ppm standard (70% of the days at one study site). The carbon monoxide problem occurred not only in the downtown commercial district but also along traffic corridors outside the core area. Exceedences were noted at least once at 28 of the study sites. Indoor CO concentrations were usually lower than at adjacent outdoor sites. Changes in average indoor and outdoor levels of CO frequently coincided.

Detailed descriptions of methods and discussion of findings are included as well as tables of data obtained during the study.

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NOVEMBER 26 - DECEMBER 22, 1977

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FOR

AIR PROGRAMS BRANCH
AIR AND HAZARDOUS MATERIALS DIVISION

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 10
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PREFACE

Under the Clean Air Act of 1970 the U.S. Environmental Protection Agency has established standards for carbon monoxide in air external to buildings to which the public has access. In a number of cities, including Boise, these standards have not yet been attained. Plans to achieve the standards are now required under the Clean Air Act Amendments of 1977 (PL 95-95). It is hoped that the material presented in this report will assist in achieving progress towards attainment of the standards.

ACKNOWLEDGMENTS

We gratefully acknowledge the assistance of members of the Idaho State Department of Health and Welfare (IDHW), the Idaho Transportation Department (ITD), and Ada Planning Association (APA), who gave freely of their time and information for the planning and conduct of this study. Their efforts contributed materially to this study, though they are not, of course, responsible for any errors herein. These people include: Richard Johnson and Doss Terrel (IDHW), John Hamrick, Keith Longnecker, and Lee Hatch (ITD); Ervin Olen, Jr. and Robert Minter, Jr. (APA). We especially wish to thank the Idaho State Department of Health and Welfare for providing facilities to establish a field laboratory in Boise for use by the EPA contractor.

Several firms and institutions permitted installation of equipment on their premises and without their cooperation, portions of this study could not have been conducted. Our sincere thanks go to St. Luke's Hospital, Idan-Ha Hotel, Sexty's Jewelers, David's Fabrics, Singer's, Falk's and Boise State University.

Finally, we express gratitude to many members of the EPA staff for guidance, encouragement, and assistance.

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Abbreviations and Symbols

AM - The four-hour* interval from 10:00 a.m.* to 2:00 p.m.*

PM - The four-hour* interval from 2:00 p.m.* to 6:00 p.m.*

AVC - The eight-hour* average CO concentration for the 10:00 a.m.* to 6:00 p.m.* sample collected at an EPA special study site (average calculated from AM and PM concentrations)

AVS - The eight-hour average from 10:00 a.m. to 6:00 p.m. of continuous non-dispersive infra-red measurements at the permanent monitor

ODD - The permanent monitor operated by the State at the Odd Fellows Hall at 115½ Ninth Street

n/o - north of as in "Ninth n/o Idaho"

w/o - west of as in "Idaho w/o Eighth"

Exceedence of Standard** - An eight-hour average CO concentration exceeding 9.0 ppm

Violation of Standard - The second eight-hour, non-overlapping, running average in a year to exceed 9.0 ppm

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* Plus or minus fifteen minutes.

** This report discusses only the standard for the eight-hour average and does not discuss the standard for one-hour average CO concentrations.

INTRODUCTION

Carbon monoxide (CO) is a colorless, odorless, tasteless, toxic gas that, in most urban areas, results primarily from exhaust emissions of motor vehicles. National Ambient Air Quality Standards (NAAQS) for CO concentrations have been established by EPA.* Routine continuous monitoring to determine compliance with these standards has been conducted in Boise since July 1975.

At the carbon monoxide monitoring site in downtown Boise, which is operated by the Idaho Department of Health and Welfare, the National Ambient Air Quality Standards are frequently violated. During 1976, on about 28% of the days, the eight-hour standard (9.0 ppm) was exceeded; the second-highest eight-hour average (18.3 ppm) was more than twice the standard. However, very little information for downtown sites, other than at this continuous monitor on Ninth Street between Idaho and Main, was available.

More information on the severity of the carbon monoxide problem and its geographical extent was desired to (1) assist in selection of candidate sites for additional routine monitoring and (2) aid determination of the probable extent of higher CO levels represented by the existing site. To address these needs, EPA engaged a contractor** to conduct a four-week study to collect data at about 33 sites simultaneously in the central business district and near-by areas (40 sites altogether) during November-December 1977. Some data were also obtained at indoor locations and along pedestrian routes. Bag samples were obtained twice daily; each represented a four-hour average. These were analyzed by an electrochemical method (Ecolyzer) for carbon monoxide.

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* Standards for CO which are not to be exceeded more than once per year are 9.0 ppm (eight-hour average) and 35.0 ppm (one-hour average). See 42 FR 8186, Federal Register, April 30, 1971.

** Alsid, Snowden, and Associates, Bellevue, Washington

This report (Part 2) documents the carbon monoxide data obtained during the Boise study and discusses the results in detail. A summary report (Part 1) has also been prepared which briefly summarizes the results and conclusions of the investigation. All of the four-hour data for ambient sites operated by EPA are also available on punched IBM cards from the regional office in Seattle. The state monitoring data may be obtained from the Idaho Department of Health and Welfare. Meteorological data were available only for sites away from the downtown area. Observations from the Boise Air Terminal available from the National Weather Service were included in this analysis.

The most recently available traffic data were obtained from the Idaho Department of Transportation; traffic counters were not operated at the temporary monitoring sites, except in one instance where the EPA site coincided with a site operated by the state highway department as part of a special state study.*

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* The Idaho Department of Health and Welfare (IDHW) and the Idaho Transportation Department (ITD) examined 46 sites primarily outside the central business district during a 4-month study (three per week). The results are available in a staff report, Boise Carbon Monoxide Study Winter 1977 - Spring 1978, from IDHW, Division of Environment, Air Quality Bureau.

SUMMARY

In 1977, a 20-day study involving forty outdoor sites, six indoor sites, and two pedestrian walking routes was conducted in Boise, Idaho, during November-December, the season when high carbon monoxide levels frequently occur. The purpose of this study was to obtain additional data regarding the magnitude of the carbon monoxide problem, its spatial extent, the representativeness of the only permanent monitor in the central business district and to assist in selection of candidate sites for routine monitoring. On each week-day, four-hour bag samples were collected from about 10:00 a.m. to 2:00 p.m. (AM sample) and about 2:00 p.m. to 6:00 p.m. (PM sample) at thirty-three of the outdoor sites and two of the indoor sites. In addition, bag samples of air were collected on two pedestrian walking routes over two to four hours during the AM and PM periods.

Data are summarized in bar charts of the measurement distribution for each site and each day of the study period, in histogram-maps showing the spatial distribution of carbon monoxide, and in tables. Results from the study sites were compared in several ways with data from the permanent monitor. Comparisons were also made between study sites along the same corridor, between indoor sites and adjacent outdoor sites, and between the two pedestrian routes. Eight-hour averages were compared with the 9.0 ppm standard.

The study results indicate that the carbon monoxide problem is widespread and not restricted to the downtown commercial district. The magnitude of the problem may be somewhat greater than shown by data from the permanent

monitor. The permanent monitor was generally representative of the higher but not the highest concentrations. Even higher concentrations and more frequent exceedences of the standard may occur on Idaho and Main as well as at a few other sites. Exceedences occurred at other locations and were more than 1.5 to 3 times greater than at the permanent monitor when no exceedences were noted at the permanent monitor. Increases in carbon monoxide at outdoor sites frequently coincided with increases at indoor sites. Pedestrians and some of the indoor population may be exposed to concentrations above the standard.

Future monitoring should address the development of control strategies (short-term) and then track progress towards achievement of the standards (long-term). Planning for such studies should consider the need for related data on traffic characteristics coupled with meteorological data.

CONCLUSIONS AND RECOMMENDATIONS

The major conclusions of a 20-day study conducted in Boise during about 10:00 a.m. to 6:00 p.m. on week-days of November-December 1977 are:

1. The magnitude of the carbon monoxide problem was somewhat greater than indicated by the permanent monitor.

   - For nine study sites, (1,10A,11, 13, 17, 18, 20, 24, and 32) the maximum eight-hour average (10:00 a.m. to 6:00 p.m.) exceeded the highest observed at the permanent monitor during the study period (13.7 ppm).

   - The highest eight-hour average (17.2 ppm) and most frequent exceedences of the 9.0 ppm standard (70% of the days) were observed at site 32 on Idaho Street west of Eighth Street which most often had the highest eight-hour average of all sites (9 of the 20 days).

2. The spatial extent of the problem encompassed not only the downtown commercial district but also locations along traffic corridors outside the core area.

   - When higher concentrations were observed in the core area, elevated CO levels also occurred elsewhere.

   - Altogether about 70% of the study sites (28 out of 40) experienced one or more days when the eight-hour average exceeded the 9.0 ppm eight-hour standard. (A total of nineteen sites experienced two or more days).

3. The permanent monitor was generally representative of the higher concentrations but was not representative of the highest concentrations or frequency of exceedences within the study area.

   - On every day but one, the eight-hour concentration at the state site was exceeded by that at one or more study sites.

   - During the survey, the second-highest eight-hour average for 10:00 a.m. to 6:00 p.m. at the state site (10.8 ppm) was nearly equalled or exceeded at a total of fourteen sites including three in the same block. At four sites (10A, 11, 17, and 32), concentrations were more than 2 ppm greater.

   - On 95% of the study days (19 out of 20) the eight-hour standard was exceeded at one or more sites. Exceedences at the state site occurred on 47% (9 out of 19) of the sampled days.

   - Eight-hour concentrations above the standard were observed at other locations and were more than three times greater than at the permanent monitor when no exceedence was noted at the permanent monitor.

   - When concentrations exceeded the standard at the permanent monitor they were also exceeded at a number of other locations.

4. Changes in CO concentrations at outdoor sites frequently coincided with changes in CO concentrations at indoor sites, but the relationship between indoor and outdoor values was not constant.

   - Concentrations were usually lower indoors than at the adjacent outdoor site.

   - Indoors, the eight-hour average concentration of carbon monoxide exceeded 9.0 ppm at times.

5. Pedestrians were exposed to eight-hour average CO concentrations exceeding the standard at times.

   - For sampling periods between two to four hours, concentrations ranged from 3.9 ppm to 14 ppm.

   - For nearly sequential sampling periods totalling seven or more hours, averages were equal to or above 9.0 ppm on four days.

It is recommended that:

1. The carbon monoxide problem in Boise be considered a widespread problem.

2. Increased local source emissions be avoided in areas where violations have been observed unless a reduction in the background concentrations which is at least sufficient to offset the increase can be demonstrated.

3. Concentrations at the permanent monitor above 9.0 ppm be considered as indicative of concentrations equally high and very likely higher elsewhere in the study area. (Note that concentrations at the permanent monitor below 9.0 ppm do not mean that air quality standards are being met throughout the study area at the same time.)

4. A site on Idaho Street (site 32 or 10A) be considered as a candidate site to represent carbon monoxide concentrations in downtown Boise for routine ambient air quality monitoring or for short-term monitoring during the late fall and winter season (November-December).

5. Planning for future studies to aid development of control strategies and track progress towards attainment of the standard should consider the need for related data on traffic and meteorological characteristics.

OUTDOOR SITES

The principal effort was directed towards the outdoor sampling sites. Thirty-three outdoor sites were simultaneously sampled each day. Of these, seven were moved at the end of two weeks, so that data from 40 sites total (Figure 1 and Appendix A, Table 1) were obtained over the four-week period. This section discusses the study area characteristics, the study methods, and the results of this multi-site outdoor sampling for carbon monoxide.

STUDY AREA CHARACTERISTICS

Topography

Boise is situated in the Boise River valley, about 8 miles below the mouth of a mountain canyon where the valley begins. The denser part of the city covers a gentle alluvial slope about two miles in width which extends southwest from the foothills of the Boise Mountains to the Boise River, averaging about 2700 feet in elevation. Boise's location in a river valley and its close proximity to the Boise Mountains, coupled with long periods of relatively low wind speed make it an area susceptible to a high frequency of inversions. This, together with the inefficiency of internal combustion engines at higher elevations effectively illustrates the potential for seasonally and persistently high carbon monoxide concentrations.

The general study area, which is nearly level, contains roughly 200 city blocks within the general bounds of Washington Street, Avenue B, Myrtle Street, and 26th Street, with a leg of Capitol Boulevard extending south to College Street. About 50% of the study sites were located in the central business core, consisting of 20-30 city blocks, with the balance of sites spread throughout the rest of the study area (See Figure 1).

Land Use/Zoning

Table 1 shows that the preponderance of outdoor study sites, 85% of the total, were in commercially-zoned areas which comprised about a third of the total study area. This does not reflect an intent to concentrate sites in the commercial area, but results from consideration of site selection factors such as traffic volumes, which were relatively high in such commercial areas. It should be noted that actual land use may differ from the particular zoning classification since current zoning designations regulate only future land uses and do not render void pre-existing ones.

Population

According to statistics in the City Center Report*, about 3100 persons presently reside in some 1900 dwelling units situated throughout the city center planning area (CCA). The CCA is an area containing about 350 city blocks which includes all but the northwest portion of the general study area examined here. The CCA's resident population is most highly concentrated in the northwestern and southwestern portions of the CCA, with a very small number housed in the central business core.

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* City Center Report: Recommended General Policies and Concepts for the Improvement of Downtown Boise, prepared by City Center Steering Committee; Ada Planning Association; Peat, Marwick, Mitchell and Co.; and Diversified Planning, Ltd; Boise, Idaho, December 1976. (p. 21)

Table 1. Study Area Characteristics

Land Use/Zoning Designations	% of Total Sites	% of Total Acreage
Commercial	85.0	34
Residential	10.0	23
Industrial	2.5	19
Institutional	2.5	--[1]
Other[2]	0	24
	100.0	100

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[1] Not included in available zoning information
[2] Primarily office and open land zones

The overall economic status of the CCA's resident population may be generally characterized as below the median income. Persons 65 years of age and over comprise about 28% of the area's resident population, which is three times the percentage for Ada County as a whole. It is interesting to note that this group resides in an area where carbon monoxide may be comparatively worse than in most other areas of the county. Persons 18 years old and under account for 16% of the CCA's resident population, or about half the county figure. The 18 to 64 year-old group accounts for about the same proportion (56%) of the resident population as in the county.

Employment

Some 1000 establishments located in and near the CCA employed a total of about 23,000 persons as of April 1976*. Of these, 9200 worked in the central business core. Government at local, state and federal levels accounts for about 30% of total employment for the CCA. Because this is a significant proportion of total employment, it may be assumed that this group of governmental employees has a significant impact on traffic volumes at times of peak commuter activity. This is mentioned because of the unique opportunity afforded "government" to institute such programs as car-pooling and flex-time in an attempt to minimize its contributory impact on traffic congestion and consequent effects on the environment and the public health.

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* City Center Report, page 22

Transportation

Access to the CCA from the south is via bridges, and from the north is primarily via State Street (serving the northwest) and Warm Springs Avenue (serving the southeast). As the CCA is bounded on the south by the Boise River, auto access into the city center from this direction is confined to bridges at Main Street and Fairview Avenue for the southwest section; Americana Boulevard, Eighth Street, and Capitol Boulevard for the southcentral portion, and Broadway Avenue for the southeast area. Traffic volumes generally conform to a characteristic daily pattern, increasing markedly at 7:00 a.m. and continuing at a relatively high level throughout the day. Traffic activity is usually highest between 4:30 p.m. and 5:30 p.m. peaking just after 5:00 p.m. The evening peak accounts for about 9% of total daily traffic volume*.

Figure 1 shows that the predominant configuration of blocks and streets in the study area can be characterized as a rectangular grid pattern. In two areas, this pattern interfaces with a grid pattern of different orientation and complex intersections result. The first instance occurs at 16th Street where Main Street branches into Fairview. The second instance occurs at Broadway Avenue where Warm Springs splits into Main Street and Idaho Street. There are two other areas of anomalous traffic patterns in the study area. One is the portion of Capitol Boulevard/Seventh Street north of Bannock Street. The other is the general area of the Grove Street, Front Street-Capitol Boulevard intersection.

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* City Center Report, page 15

Traffic circulation in the study area is concentrated on a relatively few streets (See Appendix E). Streets carrying the bulk of traffic through the central part of the study area are: Idaho, Main, Sixth, Capitol/Seventh, Front, Grove, Ninth and State. Total daily traffic volume exceeds 7,000 vehicles on at least some portion of those streets named. With the exception of State Street, the balance of streets named are one-way, and the basic pattern of traffic circulation in the central part of the study area can be inferred from them in Figure 1.

MATERIALS AND METHODS

Selection and Evaluation of Study Period

The State of Idaho Air Quality Bureau established a permanent NDIR (non-dispersive infra-red) CO monitor sited at 115½ Ninth in downtown Boise during July of 1975. Two hundred and twenty-three violations of the National Ambient Air Quality Standards (NAAQS) primary standard of 9.0 ppm CO had been registered for the period between the site's inception and December of 1977. While it is realized that data from a single monitor may not be representative of the predominant conditions in the selected study area, it nonetheless is the only source from which trends of CO characteristics can be inferred.

The November-December study period was selected to coincide with anticipated frequent days of high carbon monoxide concentrations. Figure 2 graphically represents annual trends of carbon monoxide data from the state's permanent site. The "season" for high CO is typically the interval between November and February. Within this interval, December has the highest incidence of high CO concentrations. November shows the next highest incidence of days having at least one eight-hour average greater than 9.0 ppm except for the 1975-1976 "season" when more violations occurred in January than November.

The potential for poor ventilation during the selected study period was also examined. Table 2 shows the frequency of occurrence of stable atmospheric (inversion) conditions for 1973-74.* Unfortunately, the data are available in a form that precludes examination of a particular month. The figures in the table represent composite frequencies of stable conditions for three-month intervals, generally coinciding with the four basic yearly seasons (winter, spring, etc). From these, it seems probable that the frequency of inversion-conducive conditions between November and January is relatively higher than from early spring through early fall. Thus, consideration of both previous state monitoring data and inversion-stability figures leads to the selection of the winter period (November, December, and January) when the probability of examining "worst case" conditions for carbon monoxide in Boise is greatest.

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* Ground level stable air is probably a significant factor in high CO concentrations. Some think that an urban heat island effect may create less stable air at ground-level in the city than in outlying areas.

Table 2. Incidence of Stable Meteorological Conditions

Annual Interval	Relative Frequency of Stability Classes Slightly Stable (5)	Stable(6)	Sum of 5 and 6
December, January, February	44.7%	26.3%	71.0%
March, April, May	25.8%	27.3%	53.1%
June, July, August	8.2%	41.8%	50.0%
September, October, November	17.7%	42.9%	60.6%

Note: Meteorological Stability Summary
December 1973 - November 1974, Boise Air Terminal

The study period included only weekdays, Monday through Friday, because this five-consecutive day interval was thought to provide the most effective sampling of the maximum concentrations during a seven-day week. Two intervals, Monday through Friday and Tuesday through Saturday, were considered and compared using past data at the state site. (Previous state data have clearly indicated that Sunday is the day of the week which most frequently has the lowest concentrations*). For November and December of 1976, the maximum eight-hour averages for Monday were higher than those for Tuesday for eight out of the nine weeks or 89% of the time. Maximum eight-hour averages for Friday exceeded those for Saturday during seven out of nine weeks or 66% of the time. Based on this analysis, the most effective five-day sampling seemed likely to occur during a Monday through Friday schedule. (Note: State data for November and December of 1977 analyzed after the completion of the survey offered less conclusive results. However, these data did not contravene the previous conclusion that for November and December, a Monday through Friday sampling schedule would provide the potential for maximum survey effectiveness. The maximum eight-hour averages for Monday exceeded those for Tuesday in five of the nine weeks or 56% of the time. Friday's values exceeded Saturday's by the same margin).

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* Low concentrations are also typical of major holidays such as Thanksgiving and Christmas.

The selected study interval was 10:00 a.m. to 6:00 p.m. based on a desire to approximate the daily maximum eight-hour period although this period varies from day-to-day and site-to-site. Daily patterns of CO concentrations at the state site were analyzed to isolate the eight-hour interval during a day when maximum values could be expected. Using November through December data for 1975, 1976, and 1977, each year's total of the number of eight-hour averages greater than 9.0 ppm was compiled and the fraction of that total which had occurred each hour* was calculated. From this analysis as summarized in Figure 3, two sampling intervals, 10:00 a.m.-6:00 p.m. (1000-1800) and 11:00 a.m.-7:00 p.m. (1100-1900) appear to exhibit the highest frequency of eight-hour violations. Further analysis of monthly maximums for December of 1975, 1976, and 1977 shows that the former interval exceeded the latter one in all cases. It was recognized that, insofar as the proportion of the daily traffic volume by the monitor may have been greater in the late afternoon "rush" than in the morning "rush", the time interval based on the state site's eight-hour running averages might not be representative of some other streets in the proposed study area or the area as a whole. Nonetheless, the 10:00 a.m. - 6:00 p.m. interval was selected. This period was thought to most effectively accommodate both the monitoring of some residual morning

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* By ending hour of the eight-hour period.

"rush" concentrations and afternoon "rush" values. Consecutive four-hour periods permitted calculation of eight-hour averages for comparison with the NAAQS, and confined the total daily expenditure of the contractor's time and effort to an acceptable period, thereby reducing overall costs.

In retrospect, the 10:00 a.m. - 6 :00 p.m. period was appropriate from the standpoint of most frequently observing the daily maximum eight-hour concentration at the state site. On eight of the 20 days of the study, this was the daily maximum period. No other period was as frequently the maximum. Furthermore, on two additional days, the concentration ending at 6:00 p.m. was essentially equal to the daily maximum. On only four days* did the daily maximum exceed the eight-hour average ending at 6:00 p.m. by more than 1 ppm.

Site Selection

Forty outdoor sites (Figure 1 and Appendix A) were selected after a review of traffic characteristics, potential population exposure, and planning for the Boise downtown area. Site selection emphasized those locations expected to represent relatively high CO concentrations and population exposure in a portion of the study area. However, some sites were chosen simply to provide data on the distribution of CO within the area or in sub-areas of interest due to future planning or existing land use such as residential areas. Locations were avoided where unusually high CO might occur due to close proximity to idling vehicles such as at street corners or near the entrance/exit to major parking areas. Adherence to this constraint as well as physical limitations on available points to attach samplers meant it was not always possible to place sampling equipment in the preferred street block or location within the block.

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* On 12/1 - 8.4 ppm at 3:00 p.m. vs. 5.2 ppm; on 12/13 - 2.8 ppm at 1:00 a.m. vs. 1.3 ppm; on 12/19 - 12.0 ppm at 7:00 p.m. vs. 10.8 ppm; and on 12/20 - 7.1 ppm at 2:00 p.m. vs. 4.1 ppm.

Many (but not all) of the sites were selected using a modified screening technique (intended to identify potential "hot spots") which included physical inspection of the potential sites. The "hot spot" screening guidelines prepared for EPA* consist of a two-stage process. Initially, all the traffic volumes must be identified as well as street lane configurations for various intersections (or traffic speed and lane capacities on certain roadways). These minimal data enable the user to enter prepared charts which are based on assumed meteorological conditions, vehicle mixes, and emission factors and identify sites where potential violations may exist. The second stage requires additional input data to enter a second series of charts that present the potential magnitude of the standards violation (but not the frequency). Because resources were limited and input data for Boise were lacking for a number of cases, only the first stage screening was attempted.

Onsite inspections of the general locale identified the specific sampling point within the general area and such factors as non-traffic related sources of carbon monoxide, adjacent land uses, and probable receptors (resident population, office workers, pedestrians, etc.). Criteria also included:

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* EPA - 901/9-76-001 and 002, Guidelines for Identification and Evaluation of Localized Violations of Carbon Monoxide Standards, prepared for U.S. EPA, Region I Office, Boston, Massachusetts by GCA/Technology Division, Bedford, Mass. 01730 (A later version of these guidelines is now available.)

Distance from intersection — more than 10 meters
Distance from major parking lot entrance/exit — more than 10 meters
Distance from curb — more than 1 meter
Height — 3 ± ½ meter*
Distance from building surfaces — more than 2 meters

Detailed descriptions of the forty selected sites (Figure 1) appear in Appendix A. Some sites were designated for 10 days of sampling (rather than 20 days). Most of these were outside the central business district in areas of less dense traffic. One 10-day site, No. 30A, was nearly two hundred feet from the roadway on the southeast side of the nearest heavily-travelled road (Capitol Boulevard) above a sidewalk near a dormitory. Most other 10-day sites were near major roads outside the central business district and were closer to the roadway. These included locations on Broadway, 23rd near Fairview, and State Street.

Sample Collection and Analysis

The contractor, using EPA equipment, collected and analyzed samples twice daily. At each site, a small (330 grams), intermittently operating, battery-powered pump** filled an aluminized mylar bag within a cylindrical plastic tube at about one liter per hour. The piston pump pulses on approximately every 10-12 seconds at this sampling rate. (Field adjustments of the pulse rate are possible. Power for several days' operation comes from one each 9 V and 1.5 V batteries.) After sampling for four hours (10:00 a.m. to 2:00 p.m. - AM sample), bags were removed to a field laboratory for analysis by an electrochemical method. Collection of a second 4-hour sample (PM) was begun using a different bag within less than a minute after collection of the AM sample.

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* Sample inlets were established at 3½ meters

** Modified Pulse Pump I manufactured by Environmental Measurements, Inc., 215 Leidesdorff Street, San Francisco, CA 94111 (415) 398-7664

Two dual-range (0-50 ppm; 0-100 ppm) Ecolyzers* were used for analysis. The manufacturer's specifications claim a sensitivity of 0.5 ppm, an accuracy of ± 1% full scale, and essentially linear response. Although previous studies by others have found similar Ecolyzers to respond essentially linearly over the range of the instrument, each instrument was checked. Study samples were analyzed on the 0-50 ppm scale, which would imply ± 0.5 ppm accuracy according to the manufacturer's specifications. A 1-volt DC recorder** provided a record of the contractor's sample analyses, although the Ecolyzer meter reading was the primary data record.

The unique sampling stations employed during the study were specially designed to contain the pulse pump and bag in a weather-proof shelter in a portable and easily removable configuration. Appendix B describes the sampling station consisting of a bag/pump unit which was removed daily and a "permanent" bracket unit upon which the bag/pump was mounted. Two types of mounting bracket units - one for attachment to light poles (or utility poles) and one for parking meter poles - were used. The long, aluminized mylar bag in a 33 inch long, 4-inch diameter cylinder was connected to the pump by a short (less than 8-inch) piece of flexible tubing. Separate bag-cylinder units were used for AM and PM samples.

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* Model 2600 Ecolyzers manufactured by Energetics Science Inc., 85 Executive Blvd., Elmsford, N.Y. 10523 (914) 592-3010

** Manufactured by Gulton, Inc.

During collection, each numbered bag-cylinder was marked with time of deployment and removal (pump on/pump off) to insure proper sample identification. This information was recorded on the laboratory data sheet at the time of analysis. All samples were analyzed within 24 hours of collection; usually, morning samples were analyzed in the afternoon of the same day and afternoon samples were analyzed the following morning.

The analytical procedure included an initial span check using a 20.0 ppm CO in air primary standard traceable to NBS. This was repeated every hour or after half of the analyses, whichever came first. The instrument electronic zero and the meter reading using zero air input were also compared at this time. After a series of analyses for AM or PM samples, the instrument zero and span were again checked. These checks and sample analyses were recorded on a strip chart as a secondary record, with the actual meter reading of the Ecolyzer by the instrument operator as the primary record.

Quality Control

Instrument performance was monitored through several checks on the air flow, zero and span drift, and linearity of the instrument. Various air/CO mixtures, either traceable to the National Bureau of Standards (NBS) or actual NBS gases, were used as standards. The certified CO/air mixture used both for linearity checks and in daily span checks was analyzed after the survey by non-dispersive infra-red analysis (Washington State Department of Ecology) and the concentration corresponded to the manufacturer's claimed value within the accuracy of the measurement technique. This mixture was a primary standard traceable to NBS, supplied in an aluminum spectroseal cylinder by Scott-Marrin, Inc., Riverside, California, and certified by the manufacturer at 20.0 ± 0.2 ppm. Additional primary standards from this manufacturer used during this survey to check instrument performance were air/CO mixtures at the following CO concentrations: 4.93 ± .05 ppm; 9.85 ± 0.1 ppm; 38.9 ± 0.4 ppm; and 0 ppm (ultrapure air). NBS standards utilized were air/CO mixtures at 43.2, 18.0, and 9.53 ppm.

The contractor's performance was reviewed in the field as well as by comparing strip chart records with data recorded by the operator. Values indicated on strip charts may not be absolute since the Ecolyzer meter was the basis for calibration. The recorder was zeroed to the Ecolyzer zero and inferences on trace accuracy could be made by examining recorder response to an adjusted span check. Results of these comparisons are summarized below.

1. A random check of strip chart records of sample concentrations versus operator-noted meter readings as reported by the contractor on six sets of samples (184 samples) found the majority of differences were less than 0.5 ppm, which was not considered significant. Differences for all but six pairs of values out of 184 (3.3%) were less than 0.5 ppm. In one case, the difference exceeded 1.5 ppm when the contractor reported a lower concentration (by 9% of full scale) than was recorded on the strip chart*. The latter

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* On December 2, 1977, for sample 29 the strip chart indicated 14.5 ppm but the contractor reported 9.9 ppm.

difference may be due to reading the meter before the needle stabilized at the maximum point. This type of operator error would have underestimated rather than overestimated the true value.

2. Strip chart records of all span checks and zero checks performed by the contractor before and after analyzing sample sets were reviewed by EPA. Over the 20-day survey, there were 85 sets of samples. Because the operator adjusted the zero and span on the Ecolyzer meter indicator rather than on the recorder, the strip chart records may not represent absolute values However, for all but one set of samples, the differences between the expected strip chart record and actual strip chart record of electronic zero, gas zero and 20.0 ppm CO span gas readings were less than 1.0 ppm. (See Table 3.) For one of four sets of PM samples on November 29, 1977,

Table 3

Number of Sample Sets with Deviations from Expected Strip Chart Readings for Zero and 20.0 ppm CO Span Checks

Deviation	Number of sample sets
Less than or equal to 0.5	50
More than 0.5 but less than 1.0	11
More than 1.0	1
Unknown*	23
Total	85

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* Chart annotations missing or otherwise insufficient to determine whether adjustments were made.

the strip chart indicates a possible deviation from proper calibration of 1.5 ppm (zero too low) at the end of the set, assuming that the recorder was in agreement with the meter indicator on the Ecolyzer. If it were not in agreement (as appears more likely because the zero on the strip chart had an initial value of -1.0 ppm), the maximum error in reported sample concentrations for this test was likely to be too low by less than 0.5 ppm. Although the strip chart record was intended simply to verify whether the meter reading had stabilized before a reading was taken, it also helped in evaluating the extent of a possible shift in calibration during those sets of analyses where adequate records were available. Thus, errors due to zero or span drift during analysis appear to be generally less than ± 1.0 ppm and, in fact, for most sample sets such errors appear to be less than ± 0.5 ppm.

3. Linearity was checked several times. Analyses of bags filled with various span gas concentrations by Ecolyzer Units 1 and 2 that were used for bag sample analyses appeared to be acceptable in the range of concentrations observed during the survey. (See Appendix C, Figures 1 and 2 for typical results.) In one instance, an unexplained 1.2 ppm decrease in the analytical result for the 43.2 ppm NBS standard was noted. However, instrument responses to concentrations at and below 20.0 ppm were as expected. (All measured concentrations were in this range.)

4. The instrument response to the internal electronic zero (recommended by the manufacturer for zeroing the instrument) was the same as to zero air input, except when loose internal or external hose connections allowed infiltration of ambient air. This equality proved a convenient check on operator set-up of the instrument for sample analysis.

RESULTS AND DISCUSSION

Data were examined for (1) the relative magnitude of carbon monoxide concentrations at various sites (spatial extent) for the same time period and (2) the suggested patterns of values. To evaluate the study period, the State site data obtained previous to and during the survey were compared. Several measures of the magnitude of the carbon monoxide problem were evaluated for the study sites. Maximum and minimum concentrations for each sample interval (AM, PM, and eight-hour average) for each site, for each day, and overall for the entire study were examined. Because the National Ambient Air Quality Standards address the second-highest eight-hour average, this figure was identified for each site as well as the frequency of samples exceeding 9.0 ppm. Comparisons were made with similar measures for the State's permanent monitor. In addition, ratios of concentrations at each site to those at the state site were evaluated.

Possible correlations between sites located on the same street were investigated. This included correlations between the State's permanent monitor on Ninth Street and the closest EPA study site. In addition, comparisons were made with indoor sites, however, the latter are discussed in a later section of this report.

Magnitude and Spatial Distribution of Carbon Monoxide

Collecting samples during about the same hours at a relatively large number of sites afforded a view of the carbon monoxide distribution over a relatively wide area for comparison with the State site. The daily values for AM, PM, and eight-hour intervals at each site are contained in Appendix D.

Summary statistics have been graphed as box plots and/or as histograms on a base map (Figures 4 through 16).

Box plots depict for each site the data distributions of the calculated eight-hour averages in Figure 4 and the measured concentrations for AM and PM samples in Figures 5 and 6. The range, median, arithmetic mean, and arithmetic standard deviation for each site were based on nominally 20 days or 10 days of samples, depending on the site schedule; missing data were not estimated. For the eight-hour average distributions, each site's second-highest value is also shown. Other box plots (Figures 12, 13, and 14), show the distributions of eight-hour, AM and PM data for each day based on all site (33 or fewer) values. Recall that 7 of the 33 sites were relocated after 10 days.

For each site, histograms on a base map depict the highest eight-hour average (Figure 7), the frequency of eight-hour averages exceeding 9.0 ppm (Figure 8), the second-highest eight-hour average (Figure 9), the maximum AM and PM averages (Figures 10 and 11), and the arithmetic mean of all eight-hour averages observed during the survey (Figure 15). Although similar statistics also appear on the box plots (with the exception of the frequency of eight-hour averages greater than 9.0 ppm), these histograms/maps permit easier visualization of the spatial distribution of values for the statistics of greatest interest. The last histogram/map represents each site's eight-hour average on the day of the highest overall average for all sites (Figure 16) to show the pattern prevailing on the day when most sites experienced their maximum concentrations. (Sites sampled only during the last half of the survey are, of course, not included on this December 2, 1977 map.)

Maximum Eight-Hour and Four-Hour Averages - High carbon monoxide levels were found not only in the vicinity of the State's permanent monitor but also at many other sites within the study area. Figures 4 and 7 and Table 4 show the maximum eight-hour averages for 10:00 a.m. to 6:00 p.m. (AVC) for each site during the study. About 70% of the sampling sites* experienced one or more days when the eight-hour average (AVC) exceeded 9.0 ppm (Figure 4 and Table 4). This is the level of the National Ambient Air Quality Standard for eight hours which is not to be exceeded more than once per year. More sites experienced high carbon monoxide during the PM sampling interval than during the AM interval (see Figures 5, 6, 13 and 14, and Table 5). For 80% of the sites, at least one PM average exceeded 9.0 ppm, but only about 60% had an AM average greater than 9.0 ppm. Table 5 summarizes the distributions of the maximum AM, PM, and AVC values for the forty sample sites.

For twelve sites (2, 3, 7, 15, 27B, 28A, 28B, 29B, 30B, 31A, 31B, and 33B), the maximum AVC did not exceed 9.0 ppm. The smallest maximum concentration, 4.8 ppm, was at the site most distant from any roadway. This site (no. 3), about 59 meters east of Capitol Boulevard on the Boise State University campus, probably provided a better indication of general background** concentrations than any of the other study sites since the relative contribution of the nearby roadway may have been less than for other sites. However, no measurements of concentration gradients from this heavily travelled roadway were made.

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* 28 out of 40 total sites. This includes 5 of the 14 sites sampled only for ten days. (Values rounded to the nearest whole number.)

** "Background" concentrations would be those not attributed to a single identifiable source and could vary from place to place and time to time.

Table 4. Maximum Values from Forty Sites and the Permanent Monitor
Carbon Monoxide in ppm

Site	Maximum AM 10 AM-2 PM	Maximum PM 2 PM-6 PM	Maximum AVC 10 AM-6 PM	% AVC[1] GT 9.0	Ratio[2]	Date of Maximum AVC	Second-Hi AVC	Second Ratio[3]	Date of Second-Hi
1	12.9	16.5	14.7	60	1.4	12/02	12.6	0.9	12/22
2	10.9	8.9	9.0	0	1.0	11/25	7.7	0.6	12/22
3	5.0	4.5	4.8	0	0.5	11/25	4.2	0.4	12/02
4	9.0	10.0	9.5	5	0.9	12/02	6.9	1.3	12/12
5	11.5	15.5	13.5	15	1.3	12/02	11.8	0.9	12/22
6	11.0	11.0	10.5	10	1.0	12/02	9.4	1.5	12/06
7	9.2	12.8	8.4	0	0.8	11/30	8.1	1.6	12/12
8	12.0	16.0	13.0	8	1.5	11/25	9.0	0.7	12/22
9	14.2	13.3	13.6	35	1.3	12/02	11.9	1.9	12/06
10A*	13.5	20.6	15.9	50	1.5	12/02	13.2	1.3	12/05
11	13.2	18.0	15.6	44	1.5	12/02	13.3	2.2	12/06
12	6.3	12.9	9.5	6	0.9	12/02	8.6	1.0	11/25
13	15.1	15.2	14.2	56	1.0	12/22	12.4	1.1	12/19
14	12.1	11.5	11.2	6	1.3	11/25	7.9	0.7	12/02
15	8.0	7.5	7.6	0	0.6	12/22	7.5	0.7	11/30
16	10.0	14.0	9.9	11	0.9	12/02	9.4	0.7	12/22
17	13.9	16.5	15.2	19	1.5	12/02	13.6	1.5	11/25
18	15.6	14.9	15.3	37	1.5	12/02	12.1	1.4	11/25
19	11.3	13.1	12.1	25	1.2	12/02	10.2	1.2	11/25
20	16.5	13.5	13.8	37	1.3	12/02	11.5	1.9	12/06
21	9.0	11.2	9.9	5	0.9	12/02	8.4	--	12/01
22	10.2	12.0	11.1	10	1.1	12/02	9.1	1.0	11/25
23	14.1	11.8	13.0	18	--	12/01	11.6	1.1	12/02

(continued)

Table 4. continued

Site	Maximum AM 10 AM-2 PM	Maximum PM 2 PM-6 PM	Maximum AVC[1] 10 AM-6 PM	% AVC GT 9.0	Ratio[2]	Date of Maximum AVC	Second-Hi AVC	Second Ratio[3]	Date of Second-Hi
24	12.6	17.5	15.1	10	1.4	12/02	9.1	1.5	12/06
25	11.0	15.8	13.4	11	1.3	12/02	11.0	1.8	12/06
26	8.1	14.0	10.6	5	1.0	12/02	8.6	1.0	11/25
27A*	10.1	10.1	10.1	10	1.0	12/02	7.2	1.2	12/06
27B**	4.7	6.5	5.3	0	0.4	12/22	4.1	0.4	12/21
28A	10.0	9.9	8.0	0	0.8	12/02	8.0	0.8	12/02
28B	9.0	9.3	7.8	0	0.6	12/22	6.4	1.6	12/14
29A	9.0	9.9	9.5	10	0.9	12/02	8.5	1.4	12/06
29B	7.0	4.5	5.4	0	1.0	12/12	4.9	0.4	12/22
30A	11.2	12.0	11.4	30	1.1	12/02	11.0	1.2	11/25
30B	8.0	5.7	6.0	0	1.5	12/14	4.6	0.9	12/12
31A	9.9	10.5	8.7	0	0.9	11/28	7.7	0.7	12/02
31B	7.1	6.5	6.3	0	0.5	12/22	5.7	1.1	12/12
32	15.2	19.9	17.2	70	1.3	12/22	16.5	1.6	12/02
32B	10.3	9.1	9.7	14	1.9	12/12	8.1	0.6	12/22
33A	10.5	13.3	11.6	50	1.1	11/30	10.6	1.1	12/05
33B	7.0	10.1	8.4	0	2.1	12/14	7.2	1.7	12/20
ODD***	12.4	15.1	13.7	47	--	12/22	10.8	--	12/19

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* "A" suffix indicates sampled first 10 days.

** "B" suffix indicates sampled last 10 days.

*** State's permanent monitor at Odd Fellows Hall, 115½ Ninth Street.

[1] Frequency of AVC's exceeding 9 ppm, expressed as a percentage of the number of samples.

[2] Ratio of maximum AVC to the eight-hour average for the same time at the State site.

[3] Ratio of second-highest AVC to the eight-hour average for the same time at the State site.

Table 5. Distribution of Maximum Values from Forty Sites in Boise

Range of Maximum Carbon Monoxide*, ppm		Percent* of Sites Within Range		
Equal or More Than	Less Than	Maximum AM 10 AM-2 PM	Maximum PM 2 PM-6 PM	Maximum AVC 10 AM-6 PM
0 -	3	0	0	0
3 -	6	5	8	8
6 -	9	9	18	10
9 -	12	42	28	35
12 -	15	25	30	22
15 -	18	10	18	18
18 -	21	0	10	0

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* Rounded to integer values

For comparison, the site on the opposite side of Capitol Boulevard (Site 27A) nearer the roadway (about 10 meters distant) experienced a much higher maximum AVC (10.1 ppm on December 2, 1977). Relatively low maximum AVC's occurred along residential areas of State Street* which carries traffic from the northwest to the central downtown area. However, the standard was exceeded at the only State Street site sampled during the first ten days (west of 22nd, site 26, 10.6 ppm on December 2, 1977). AVC's were always less than 9.0 ppm at Sixteenth north of State (site 28B), and at Thirteenth north of State (site 27B). Concentrations were generally higher on Sixteenth than Thirteenth Street as was expected from the traffic characteristics.

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* West of Eighteenth (site 29B) and west of Twenty-fifth Street (site 30B).

Of the maximum eight-hour concentrations at each site for the 10:00 a.m. to 6:00 p.m. period (Figure 4), the highest eight-hour value was about 17 ppm. This occurred on Idaho Street west of Eighth Street (Site 32) on December 22, 1977. Of the remaining sites, the next highest eight-hour value was across the street at site 10A. These sites are one block from the permanent monitor, which is on Ninth, but are on a NW-SE street perpendicular to Ninth. Traffic volumes are generally greater on Idaho (an east-west street) than on Ninth in front of the permanent monitor, but no traffic counts were made during the survey at either location.

For twelve sites (1, 5, 9, 10A, 11, 13, 17, 18, 20, 24, 25, and 32), the maximum eight-hour average during the survey very nearly equalled (±0.5 ppm) or exceeded that of the permanent site for the 10:00 a.m. to 6:00 p.m. period (13.7 ppm on December 22, 1977). All such sites are listed in Table 6. Most were within three blocks of the permanent site*, with three exceptions: Site 1, 9-10 blocks southeast on Broadway; Site 24, which is seven blocks west on 16th; and Site 25, 14 blocks west on 23rd. The blocks represented by these sites were: Broadway north of Myrtle; Capitol north of Idaho; Ninth north of Main and north of Idaho; Idaho west of Eighth and Idaho west of Tenth; Main west of Tenth and west of 11th; 16th north of Main; and 23rd north of Fairview.

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* Sites 9 and 13 were in the same block as the permanent monitor and experienced similar maximum eight-hour averages. Site 33A was also in the same block.

At all of these sites the eight-hour standard was exceeded more than once and several experienced exceedences on over 25% of the sampled days. At the state site, 47% of the 10:00 a.m. to 6:00 p.m. averages (AVS's) exceeded 9.0 ppm. Comparable or greater frequencies were observed at sites 1, 10A, 11, 13, 32, and 33A with the most frequent exeedences at site 32 (70% of the sampled days). Figure 8 illustrates the frequency of AVC's greater than 9.0 ppm for each site.

Second-Highest Eight-Hour Averages (AVC's) - Figures 4 and 9 show the second-highest AVC for each site. However, the study design did not permit comparison of sites as to the extent by which the eight-hour standard may have been violated at each site during November-December, because only one eight-hour period 10:00 a.m. to 6:00 p.m. was included each day. For example, the AVC for a site heavily affected by morning peak hour traffic may be low on Figure 4 because this peak was not included in the sampling period. However, the maximum eight-hour period for that site may have encompassed that time, rather than the sampling time.

The study data indicate that some sites, even with this limited data base, appear to violate the 9.0 ppm eight-hour standard which is not to be exceeded more than once per year (Table 4). A total of nineteen sites (1, 5, 6, 9, 10A, 11, 13, 16, 17, 18, 19, 20, 22, 23, 24, 25, 30A, 32, and 33A) experienced at least two days with an eight-hour average over 9.0 ppm. These sites were widespread through the study area and included sites on Broadway north of Myrtle; several blocks between Idaho and Main (on 9th, 11th,

Table 6.

Sites with Maximum* Eight-hour Averages

Nearly Equalling** or Exceeding that of the Permanent Monitor

Site Number	CO, PPM Maximum AVC 10 AM - 6 PM	1977 Date of Maximum AVC	Location	Side of Street
32	17.2	12/22	Idaho w/o 8th	N
10A	15.9	12/02	Idaho w/o 8th	S
11	15.6	12/02	9th n/o Idaho	E
18	15.3	12/02	Main w/o 10th	N
17	15.2	12/02	Idaho w/o 10th	S
24	15.1	12/02	16th n/o Main	W
1	14.7	12/02	Broadway n/o Myrtle	W
13***	14.2	12/22	9th n/o Main	W
20	13.8	12/02	Main w/o 11th	S
9***	13.6	12/02	9th n/o Main	E
5	13.5	12/02	Capitol n/o Idaho	W
25	13.4	12/02	23rd n/o Fairview	E

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* This is the maximum for the site during the entire study. The maximum 10:00 a.m. to 6:00 p.m. average at the State site was 14 ppm on 12/22/77. On any one day, other sites may have had concentrations equalling or exceeding that of the State site on the same day.

** Nearly equalling - plus or minus 0.5 ppm.

***Sites 9, 13, and 33A were in the same street block as the permanent monitor. (The maximum for site 33A was 12 ppm, but this site was not sampled during the last 10 days of the survey when the maximum values occurred for the other two sites.) Most sites experienced their maximum eight-hour values on 12/02/77 (Friday) or, for the remaining few sites, on 12/22/77 (Thursday), the last day of the survey when the maximum for 10:00 a.m. to 6:00 p.m. was noted at the State's permanent monitor.

and 16th); several blocks north of Idaho (on 8th, 9th, and 10th); both blocks sampled on Idaho (west of 8th and 10th); and several blocks on Main (west of 10th, 11th, and 15th); as well as on Front west of 15th; Capitol north of Myrtle and Idaho; and 23rd north of Fairview. Undetected violations may have occurred at other sites or with greater magnitude at these same sites during the days of the study.

The maximum second-highest AVC, recorded for any site was 16.5 ppm on December 2, 1977 at Idaho west of Eighth. For comparison, the second-highest eight-hour average for the permanent monitor was 10.8 ppm on December 19. This was nearly equalled or exceeded by second-highest AVC's at a total of fourteen sites including the three in the same block. However, only four were more than 2 ppm greater* (10A, 11, 17, and 32) and these were within a few blocks of the permanent monitor.

Comparisons of AM and PM Averages

For the state's permanent monitor and its corresponding study site (Site 13), the AM averages were lower than the PM averages. Because the AM sample did not include the morning traffic peak, but the PM sample spanned the late afternoon commuter traffic, it was expected that AM concentrations at most sites would be less than for PM samples. Although this seemed generally true (Appendix D), the highest concentration for the AM exceeded that for the PM sample at several locations including six sites along Main Street (14, 15, 18, 20, 23, and 28A) as well as sites 2,

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* Second-highest AVC above 12.8 ppm

3, 9, 29B, 30B, 31B, and 32B. This is shown in Table 3 and Figures 5, 6, 10, and 11. Although differences were slight in most cases, the AM maximum was 2 ppm or more higher than the PM maximum for sites 20, 23, 29B, and 30B.

On most days, the site-to-site variation in the AM averages was less than for the PM averages (as shown by comparison of ranges on each day in Figures 13 and 14) and the highest four-hour average, considering all sites, occurred in the afternoon. The lowest four-hour average usually occurred for an AM sample. However, for two days, the PM averages for most sites were markedly lower than the AM averages (11/29, and 12/14) as is shown by comparison of the median* values. For December 7, very little difference between the distributions of AM and of PM averages was noted.

Figures 12, 13 and 14 also illustrate the unusually high concentrations which prevailed on 12/2 (Friday) and the higher medians on 11/25 (Friday), 12/6 (Tuesday) and 12/22 (Thursday, the last day of study) for eight-hour and PM averages. The AM averages were also generally highest on 12/2 (Figure 13).

On December 2, the highest AM and PM averages of the study were observed and both were higher than corresponding values for the permanent site. The highest AM average, 16.5 ppm, occurred on Main Street (site 20) where PM concentrations later dropped to 11.1 ppm. The highest PM average 20.6 ppm, occurred on Idaho (site 10A) having risen from earlier AM concentrations of 11.2 ppm. In comparison, the AM and PM averages for the state site were 9.5 and 11.5 ppm on this day.

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* Mean values were usually quite similar to median values except for 12/20 PM averages.

Patterns of CO for Eight-hour and Four-hour Samples

Composite averages of all site values for each of three time periods were computed for each day of the survey and are shown in Figures 12, 13, and 14. The site values include four-hour AM (10:00 a.m.-2:00 p.m.), four-hour PM (2:00 a.m.-6:00 p.m.), and 8-hour (10:00 a.m.-6:00 p.m.) averages. The daily composite averages for each parameter were reviewed for suggestions of recurring patterns although it is realized that the sampling interval was only twenty days, and that seven sites were relocated from one general side of the CBD to the other after ten days.

Weekly Patterns - Because sampling began on a Friday and ended on a Thursday, there were only three weeks with complete Monday-through-Friday intervals. This renders any inferences about the existence of any weekly patterns tenuous at best. However, the four-hour PM daily composite averages (Figure 14) suggest a weekly bimodal pattern with a peak on Monday or Tuesday and again later in the week on Friday. The higher values of the week were never on Wednesday and were usually on Monday or Friday.

Diurnal Patterns - For the two sampling periods within the day, the four-hour PM daily composite average usually exceeded the four-hour AM average. This was true 80% of the time (16 out of 20 days), with an average difference of 1.2 ppm. Conversely, the four-hour AM daily composite average exceeded its four-hour PM counterpart 20% of the time by an average difference of 1.2 ppm.

Meteorological Comparisons - An attempt was made to compare wind speed with CO concentrations for each of the three sampling intervals: AM, PM, and eight-hour. The most immediate source of available meteorological data is the Boise Air Terminal which lies about 3.5 miles southwest of the study area and is nearly 150 feet higher in elevation. The relationship between the meteorology of the airport and the study area is unknown, but the airport meteorology is thought by consulted meteorologists to be generally representative of the study area. However, a recent report* states that wind speeds are often lower in the downtown area than at the airport.

Meteorological data from the airport were compared with daily composite CO values for the three intervals of analysis (AM, PM and eight-hour). On days when winds were in the approximately 1 to 10 knot range, the corresponding composite CO average was usually 3 to 10 ppm. Two exceptions occurred on December 2, 1977: average wind speeds for both the PM and eight-hour intervals were 6 knots, but composite CO averages were 13 and 12 ppm, respectively. However, when wind speed exceeded about 10 knots, CO concentrations in all three intervals were usually about 5 ppm or less. One exception occurred on December 4, 1977: average wind speed for the PM interval was 11 knots, but the composite PM average was 6 ppm. The lowest AM, PM and eight-hour daily composite averages (between 3 to 5 ppm) occurred on two days** having the highest average AM, PM and eight-hour wind speeds (between 14-16 knots). The combined average of daily composite eight-hour values for days when the eight-hour average wind speed was greater than or equal to 10 knots (averaging 12.6 knots) was 4.6 ppm. This is 2.5 ppm lower than the average for days when the eight-hour average wind speed was less than 10 knots (averaging 5.3 knots) which was 7.1 ppm.

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* IDHW, Boise Carbon Monoxide Study/Winter 1977 - Spring 1978, Division of the Environment, July 1978.

** December 7, and December 13, 1977.

As anticipated, the data suggest that there is more extensive ventilation at higher wind speeds and consequently lower concentrations of CO than at lower wind speeds. Better understanding of the relationship between the airport meteorology and that of the downtown area is needed for further analysis. In future surveys, meteorological equipment (at least an anemometer) should be sited in the general sampling area to provide a closer source of meteorological data.

Average of Eight-Hour Values at Each Site

For three sites, the average of all eight-hour values exceeded 9.0 ppm (sites 1, 10A, and 32,). Relative averages for all sites appear in Figure 15. Most of the sites with higher averages were in the central area; however, not all sites in that area had high averages. For example, the average for site 15 was relatively low, although that for site 14 directly across the street was higher. Average eight-hour values were lowest at site 3 on the Boise State University Campus.

Maximum Day

Figure 16 shows the pattern of carbon monoxide concentrations in the study area on the day when the composite average of eight-hour values was highest

- December 2, 1977. Most sites sampled on that day experienced their highest concentrations then. (Table 4). However, on December 22, the highest concentration during the survey was observed at site 32. Its second-highest value occurred on December 2 and was the highest for that day. Maximums at site 13 and the permanent monitor also occurred on December 22 rather than December 2.

Twenty-four of the twenty-nine sites sampled on December 2, 1977, experienced concentrations above 9.0 ppm. Only sites 2, 3, 14, 28A, and 29 did not. This suggests a widespread problem, rather than a few isolated hot spots.

Comparison of Site 13 and the Permanent Monitor

For a comparison of the study method (bag sampling/Ecolyzer analysis) with the routine monitoring at the state site, one study site was selected as close as possible to the monitoring probe inlet at 115½ Ninth Street. However, because the study equipment was attached to a parking meter (as at other locations), the actual sample inlet was a few feet north of the monitoring probe, a few feet closer to the roadside curb, and a foot or two lower. Nevertheless, the eight-hour averages from the two locations were highly correlated with data from the study site about 0.9 ppm higher (R-SQ equalled 0.94 for the regression line: AVC= 0.92 + 0.98 X AVS). Such differences may result partially or wholly from non-uniform distribution of CO vertically and along the street. The study site was slightly closer to the intersection of Ninth Street with Idaho and study results indicated higher concentrations on Idaho Street.

Correlations Between Sites on Same Corridor

The relationships between carbon monoxide concentrations at sites along the same street corridor were of interest. Previous studies have pointed out that substantial differences can exist between CO at sites in the same blocks on opposite sides of the street (cross-street pairs) when winds are across rather than along the street. Eight-hour averages for sites located along the same street corridor were analyzed by least squares regression to investigate any correlations between sites along the corridor. In most cases, correlations were weak or insignificant for fitting a linear first-order equation (Y = A + B x X). Of the nine corridors examined -- Broadway Avenue, 16th/Americana Boulevard, Main Street, State Street, Eighth Street, Ninth Street, 13th Street, Idaho Street, and Capitol Boulevard -- the last four had at least one pair of sites for which the square of the coefficient of correlation (R-SQ or index of determination) was greater than or equal to 0.75*.

Results are summarized in Table 7. For the Ninth Street corridor pair, sites 13 and 33A, that were on the same block and side of Ninth Street about 30 meters apart, the index of determination was 0.93 for five data pairs.

The last corridor, Capitol Boulevard, had two pairs of sites where the index of determination was greater than or equal to 0.75; the sites 3/30A pair with an index of 0.80 (9 data pairs) and the sites 4/27A pair having an index of 0.79 for 10 data pairs. This is a peculiar corridor in that sites 3 and 27A are almost a cross-street pair as are sites 4 and 30A, and yet both these "cross-street" pairs have indices of determination less than 0.50.

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* R-SQ of 0.75 was picked as a screening level for all corridor pairs although the confidence interval varies with the number of observations. For 20 observations, the minimum value of R-SQ for significance at the 95% confidence level is 0.19. For 10 observations, it is 0.40.

Table 7. Corridor Analysis

Corridor	Site Pair	Relative Locations of Sites	Data Pairs	Index (R-SQ)*
9th Street	13/33A	Same block same side, about 30 m. apart	5	0.93
13th Street	21/27B	Three blocks apart, same side (east)	10	0.76
Idaho Street	10A/17	Two blocks apart, same side	7	0.76
Capitol Blvd.	3/30A	About six blocks apart, same side (east)	9	0.80
Capitol Blvd.	4/27A	About six blocks apart, same side (west)	10	0.79

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* The minimum value of the square of the correlation coefficient for significance at the 95% confidence level for ten data pairs would be about 0.40. This means that the confidence interval for R-SQ would not include zero for values equal to or greater than 0.40.

The members of the 3/30A pair are about six blocks apart and located on the same side of Capitol and the same is true for the 4/27A pair.

Altogether, five total pairs of sites located along corridors exhibited indices of determination greater than or equal to 0.75. These constitute about 10% of the total number of corridor-grouped pairs examined.

Comparison of Sampling Results at Broadway/Warm Springs

Site 2, on the east side of Broadway south of its intersection with Warm Springs, was also monitored for one week by the State as part of a special study which permitted comparisons. The sample inlets were in the same general location, but were a few feet apart. The maximum difference for eight-hour averages was 2.0 ppm. For comparable four-hour averages (Table 8), the average absolute difference was 1.3 ppm; the maximum difference was 3 ppm.

The undetermined sources of differences might include the sample inlet locations as well as the analytical and data processing methods. (The State monitored concentrations continuously using an electrochemical oxidation method and averaged the concentrations for hourly averages expressed to a whole number. These hourly averages were used to compute four-hour averages for comparison.)

Table 8. Comparative CO Concentrations at Site 2
(ppm)

	Eight-Hour		AM		PM	
Date	State	Site 2	State	Site 2	State	Site 2
11/28	6	4.0	5	4.0	7	4.0
30	7.2	6.0	6.5	6.8	7.8	5.2
12/1	0.4	1.6	0	1.0	0.8	2.1
2	5.9	6.6	3.5	4.3	8.3	8.9

State Site

The eight-hour average for 10:00 a.m. to 6:00 p.m. at the permanent monitor was higher than at any study site on only one day of the study (Table 9). On half of the remaining days, the maximum carbon monoxide average was 10% to 40% greater than at the permanent monitor and otherwise ranged from 80% to 680% greater. Concentrations on Idaho west of Eighth (site 32) were higher than at any other study site on 10 of the 19 days for which comparisons were possible. However, the permanent site experienced higher concentrations on one of these days (December 15.) This was the only day when the permanent site's eight-hour daily maximum* was higher than at any study site. The study ended on Thursday, December 22, the day before the highest eight-hour average for 1977 was recorded at the permanent monitor - 18.5 ppm ending at 6:00 p.m. Based on the

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* For any eight consecutive clock hours.

Table 9

Comparison of Maximum Study Site Each Day and State Site Eight-Hour Averages (carbon monoxide in ppm)

	STUDY SITES			STATE		
1977 Date	Maximum Study Site	Maximum AVC*	Ratio AVC /AVS	AVS*	Maximum Eight-Hour	End Hour
11/25	32	16.2	1.8	8.8	9.3	1500
28	32	11.3	1.2	9.8	10.7	1600
29	1	11.0	1.3	8.3	8.3	1800
30	33A	11.6	1.1	10.7	10.7	1800
12/01	23	13.0	-	-	-	-
02	32	16.5	1.6	10.5	10.5	1800
05	10A	13.2	1.3	9.9	9.9	1900
06	11	13.3	2.2	6.2	6.2	1800
07	32	8.7	1.4	6.4	7.4	1500
08	13	9.4	1.2	7.6	8.2	2000
09	32	12.1	1.2	9.7	9.7	1800
12	1	11.1	2.1	5.2	8.4	1500
13	11	9.8	7.8	1.3	2.8	0100
14	11	11.9	3.0	4.0	4.0	1800
15	32	9.9	.9	10.7	10.7	1800
16	32	11.0	1.8	6.0	6.4	1500
19	13	12.4	1.1	10.8	12.0	1900
20	20 and 11	10.1	2.4	4.1	7.1	1400
21	32	12.6	1.2	10.2	10.5	2000
22	32	17.2	1.3	13.7	13.7	1900

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* Eight-hour average for 10:00 a.m. - 6:00 p.m. (1000 - 1800)

study data, it seems likely that even higher concentrations occurred at other sites on that day.

Sites 1, 10A, 11, 13, 20, and 33A were other study sites which were "maximum" on at least one day. Figure 17 traces the daily change in values at site 32 and in the range of eight-hour averages for sites 1, 10A, 11, 13, and 32. Concentrations at site 32 were typically at or above the median.

Correlations were examined for the permanent site and each study site using a readily available, linear regression (Y = A + B x X) on the unadjusted data. Because air pollution data may be log-normally distributed, correlations were also examined for the least squares fitting of the curve form $Y=A \times X^B$. However, in most instances there was little or no improvement in the square of the correlation coefficient and those results are not presented here.

The highest correlations (R-SQ greater than 0.5) are summarized in Table 10. It is interesting to note the omission of site 9 which is on the east side of Ninth Street across from the permanent monitor, although sites 13 and 33A on the same side are included. Sites 16 and 19 are on the west sides of 10th and 11th Streets, respectively, and site 15 is on the south side of Main Street.

Daily values of the eight-hour average CO at each site were compared to those at the permanent monitor. The ratio of the study site (AVC) value to that of the permanent monitor (AVS) was computed for each day for each site. The average of the daily ratios for site 32 compared to the permanent monitor was 1.5. The highest daily ratios (up to 7.8 for site 11 at 9.8 ppm) were observed on the day of the lowest average at the state site (12/13/77 - AVS equalled 1.3 ppm). On that day, most study sites experienced concentrations of from 2 to 6 ppm. Exceptions were site 11 (9.8 ppm) and sites 2, 3, 5, 16, 15, and 27B (0.7 to 1.5 ppm for the 10:00 a.m. to 6:00 p.m. sample interval).

Concentrations at one or more of the study sites were above 9.0 ppm and at the same time exceeded those at the permanent monitor for the 10:00 a.m. to

Table 10. Regression Equations for State Site/Study Data*

Site	R-SQ	No. of Data Pairs	Regression Equation
13	.94	17	AVC= 0.9 + 0.97*AVS
15	.56	15	AVC= 0.9 + 0.44*AVS
16	.67	18	AVC= 0.6 + 0.64*AVS
19	.51	19	AVC= 2.7 + 0.54*AVS
32	.61	19	AVC= 4.4 + 0.81*AVS
33A	.98	5	AVC= 0.3 + 1.05*AVS

* Only those regressions for which the correlation coefficient (R-SQ) exceeds 0.50 are shown here.

Note: AVC - Study site eight-hour average for 10:00 a.m. - 6:00 p.m.

AVS - State site (permanent monitor) eight-hour average for 10:00 a.m. - 6:00 p.m.

R-SQ - The square of the correlation coefficient for the linear regression equation. The confidence interval varies with the number of data pairs. For 15 data pairs, the confidence interval for R-SQ = 0.49 would be about .084 to 0.79.

6:00 p.m. period by 50% or more on eight days of the study. (See Appendix D). These included sites 1, 6, 8, 9, 10, 11, 17, 18, 20, 25, 32 and 32B and days 11/25, 12/02, 12/06, 12/12, 12/13, 12/14, 12/16, and 12/20. Thus concentrations below the standard at the state site may not represent compliance with standards at these and, possibly, other sites on the same day.

SUMMARY

The most important results from the outdoor site portion of the Boise study are summarized below:

1. Based on review of all the study data, sites 1, 10A, 11, 13, 17, 24, and 32 had eight-hour, AM, and PM maximums at sometime which exceeded the highest value of the state site data observed during weekdays of the study period.

2. Concentrations of carbon monoxide are generally higher and more frequently higher on Idaho Street west of Eighth Street (site 32) than at the permanent monitor.

3. Concentrations exceeded the 9.0 ppm standard and were at the same time 50% greater than at the state site at several sites.

4. On the day when the greatest composite average occurred, the majority of sites (which were widespread through the study area) experienced concentrations above the 9.0 ppm standard which is not to be exceeded more than once per year.

5. The highest eight-hour average concentration, 17.2 ppm, was at site 32 (Idaho Street w/o Eighth Street) on December 22, 1977. This site also experienced the most frequent occurrence of concentrations above 9.0 ppm.

CONCLUSIONS AND RECOMMENDATIONS

Based on the data in this study, the Idaho and Main thoroughfares and various of their adjacent cross-streets from Capitol to 16th clearly have poor existing air quality that appears to be in violation of the National Ambient Air Quality Standards for carbon monoxide. At least two of the main roads carrying traffic to and from the benches south of town also experience probable violations of the standard north of their intersections with Myrtle (Capitol and Broadway). One site in the general vicinity of the proposed western portion of the Broadway-Chinden corridor (Front west of 15th) and 23rd north of Fairview also have poor air quality.

Increasing local vehicle emissions in these (and possibly other) areas would very probably worsen existing problems at the identified sites, unless a very substantial reduction in areawide emissions is achieved. The relative contribution of the background and local sources to concentrations of carbon monoxide at various sites should be examined before allowing any increase in local emissions in blocks where violations now occur. Unless a reduction in the background concentration which is sufficient to offset the increase due to increased local source emissions can be demonstrated, actions which increase local emissions should be avoided if air quality improvement is a desired objective.

The following conclusions and recommendations are offered:

1. Data from this study suggest that the magnitude of the carbon monoxide problem may be somewhat greater than previously thought. For example, concentrations on Idaho west of Eighth appear to be fairly consistently higher than at the permanent monitor.

2. The spatial extent of the carbon monoxide problem encompasses widespread sites through the study area.

3. Concentrations above 9.0 ppm at the permanent monitor are indicative of elevated carbon monoxide levels elsewhere in the study area.

4. When concentrations are below the standard at the permanent monitor, carbon monoxide levels at other locations (even nearby) may exceed the standard and be well over 50% greater than at the 115½ Ninth Street monitor.

Regarding candidate sites for routine monitoring, the following recommendations are made:

1. Of the various study sites, the location most likely to represent peak carbon monoxide concentrations from 10:00 a.m. to 6:00 p.m. would be site 32 on the north side of Idaho west of Eighth. Shoppers and office workers contribute to the relatively high pedestrian traffic along this block, which contains various stores and office buildings nearby. Site 10A on the south side of Idaho may experience similar concentrations with similar population exposure.

2. Observations on other candidate monitoring sites are:

   Site 11 - This location on Ninth north of Idaho frequently experienced high concentrations of carbon monoxide and values were not well-correlated with those at the permanent monitor.

   Site 18 - This site or another one on Main Street (e.g., site 20) may experience high concentrations which are not well-correlated with those at the permanent monitor. However, pedestrian traffic at site 18 appears to be relatively light.

Site 1 - Although this location on Broadway north of Myrtle frequently experienced high CO levels, pedestrian traffic is light in this area. However, an office building on the west side of Broadway may draw ventilation air from the vicinity of this site. Data from this location may or may not be representative of nearby concentrations elsewhere. Heavy commuter traffic queues at the Broadway/Myrtle intersection and emissions from idling vehicles probably contributed to the observed levels. Such emissions may have dispersed more readily where buildings were absent or further set-back from the roadway. Consequently, additional sampling to examine the distribution of CO in this area would be desirable before establishing a permanent monitor here.

INDOOR SITES

Although no standards exist for exposure of the general public to carbon monoxide in air within buildings, it is of interest to know what levels exist indoors*. Many people spend significant amounts of time inside. Consequently, the combined effects of exposure both indoors and outside deserve consideration for a significant portion of the population. Although carbon monoxide levels indoors may be elevated at times due to non-vehicle sources (e.g., smoking tobacco, incomplete fuel combustion, etc.), several studies in other cities have shown that even in the absence of such sources, high carbon monoxide concentrations indoors may occur when outside levels are high.

For each of six locations, a brief survey of indoor levels of carbon monoxide was conducted simultaneously with measurements of outside levels at a nearby site. This section outlines the methods and results of this study. Because only ten or fewer days of data were obtained at any location, statistical correlations with outdoor sites were not attempted.

METHOD OF STUDY

For two locations at a time, continuous monitoring equipment as well as a bag sampling unit was placed indoors in an area remote from potential localized sources of carbon monoxide (such as cigarette smokers). Operation was during the same periods as for the outdoor sites; i.e., weekdays from 10:00 a.m. to 6:00 p.m. with bag samples from 10:00 a.m. to 2:00 p.m. (AM sample) and from 2:00 p.m. to 6:00 p.m. (PM sample). Determination of carbon monoxide by both methods provided an internal check on the data and a "back-up" to minimize periods of unmeasured levels. The bag sampling units were similar to those used outdoors.

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* However, guidelines have been developed for ventilation air quality as ASHRAE Standard 62-73 which is used by architects and engineers. That standard for maximum allowable contaminant concentrations for ventilation air establishes an annual arithmetic average (17.5 ppm), and an eight-hour average not to be exceeded more than once per year (26 ppm). These and other standards are discussed in EPA-600/7-78-027, Survey of Indoor Air Quality Health Criteria and Standards, March 1978.

Site Selection

Figure 18 and Table 11 describe the locations of the indoor sites and adjacent outdoor sites. One site was a hotel and four sites were retail stores (including a large department store) in the central downtown area within a few blocks of the permanent monitor. The sixth site, a hospital, is about a mile east of the monitor in a generally residential area where a number of other health care facilities, associated businesses, and professional offices are found.

Factors considered in site selection included: proximity to an outdoor study site, air intakes and ventilation, heating system (fuel combustion on premises), building uses, and size and height of the building. Within the building, the sampling equipment was placed to avoid tobacco smoke and provide convenient access for site attendants in areas normally used by the building occupants or in areas of air flow from normally used areas. At one site, BIN3, after sampling for three days, the use of small acetylene torches in a nearby room was discovered. Although acetylene, if present in the sampling area, was probably adequately removed by the charcoal filter in the sampling

Table 11. Indoor Site Characteristics

Site	Address	Business	Building Height	Sample Location
BIN1	Main & 10th	Hotel	6 Floors	6th Floor - Stairway with air exchange from elevator shaft.
BIN2	130 E. Bannock	Hospital	3 Floors	2nd Floor - Supply room in West Wing.
BIN3	Idaho & 9th	Retail Jeweler's	2 Floors	2nd Floor - Open hall at top of stairs.
BIN4	109 N. 9th	Retail Fabrics	2 Floors	1st Floor - Shopping Area
BIN5	114 N. 9th	Retail Sewing	2 Floors	1st Floor - Shopping Area
BIN6	100 N. 8th	Department Store	2 Floors	1st Floor - Shopping Area

train, this site was abandoned because acetylene is a potentially interfering substance for CO analysis by Ecolyzers. However, data from this site are included here.

Sample Collection and Analysis

For continuous monitoring, one of two modified Ecolyzers (Model 2100 with 0-100 ppm range) was used at each site with a 0-1 volt DC strip chart recorder (similar to those used to record analyses of bag samples for outdoor sites). The principal modification of the Ecolyzer was an automatic electronic zero at about once per hour. The sampling train consisted of a glass fiber particle filter; a granular charcoal filter; an interference filter assembly (manufacturer's standard); and a humidity bottle before the pump inlet. The analyzer was spanned with a certified primary standard carbon monoxide/air gas mixture (20.0 ppm) and zeroed manually at least once daily. After any necessary adjustments were made, the equipment was re-checked a minute or two later. Linearity was checked on each instrument and appeared to be generally satisfactory.

The contractor collected and analyzed indoor bag samples using the same type of equipment used for outdoor sites and attended the continuous monitors but did not reduce the strip chart records to average concentrations. EPA personnel manually read each strip chart (tape) and calculated hourly average concentrations which were the basis for 4-hour AM and PM averages. No eight-hour average was calculated if fewer than seven hours of the record were available.

RESULTS AND DISCUSSION

Two objectives of the indoor study were: 1) to compare concentration indoors with those at adjacent outdoor sites; and 2) to determine the range of indoor concentrations experienced at various indoor sites. Because of the limited scope and duration of the sampling effort, no statistical comparisons were attempted. Indoor/outdoor comparisons of each site's eight-hour averages each day are shown in Figures 19, 20, 21, and 22. The hourly averages for the day of the highest eight-hour average for which continuous analyzer records were available is also shown for each site to illustrate the daily patterns. (Concentrations were rounded to the nearest 0.5 ppm for plotting). Table 12 shows the range of concentrations at each indoor site. A summary of hourly data and bag sample data for each day is contained in Appendix D.

Four of the six indoor sites appeared to have experienced carbon monoxide concentrations exceeding the outdoor eight-hour standard of 9.0 ppm. The highest indoor eight-hour averages for the hotel site, the retail jeweler's store, the sewing store (opposite the state monitor), and the department store were about 1 to 2 ppm above the outdoor standard . The lowest measured eight-hour averages were about 2 ppm. The hospital site may have experienced even lower concentrations. However, on the day when the AM sampling indicated nearly undetectable levels, no valid PM sample was obtained.

From Figures 19 through 22, a general correspondence between the eight-hour average at indoor sites and adjacent outdoor sites can be seen for most sites. For BIN1, the hotel site, any correspondence is less evident (Figure 19), partly due to gaps in the data and partly due to the sample location. Air sampled on the sixth floor of this hotel no doubt included air

Table 12. Range of Concentrations Observed at Boise Indoor Sites[1]
(CO in ppm)

Site	Location	AM Average[2] Minimum - Maximum	PM Average[3] Minimum - Maximum	8-Hour Average[4] Minimum - Maximum
BIN1	Hotel	6.4^T - 8.5^B	3.7^T - 11.5^B	5.0^T - 10.0^B
BIN2	Hospital	0.2^T - 9.1^B	1.8^T - 6.0^B	2.0^T - 5.0^B
BIN3	Jeweler's	2.8^T - 10.1^B	2.0^T - 12.7^T	$2.4^{B,T}$ - 10.8^B
BIN4	Fabric Store	2.2^B - 5.2^T	6.3^B - 7.2^T	4.2^B - 6.4^T
BIN5	Sewing	2.8^B - 11.1^B	3.0^B - 10.5^B	2.9^B - 10.8^B
BIN6	Department Store	1.8^B - 10.1^B	2.1^B - 12.6^T	2.0^B - 11.1^T

T - Based on tape record from a continuous analyzer

B - Based on bag sample

[1] Sampling occurred over different days at these sites.

[2] AM - 10:00 a.m. to 2:00 p.m.

[3] PM - 2:00 p.m. to 6:00 p.m.

[4] Eight-hour average - 10:00 a.m. to 6:00 p.m.

entering at that level and other above ground levels so that correspondence with a single ground level site might be expected to be relatively poor.

On November 28, 1977, the indoor concentrations exceeded the low concentrations observed at the adjacent site on the southwest part of the block, site 14. However, much higher concentrations were then occurring very near the State site at site 13 . (The hotel is on the southwest of the rectangular city block and the permanent site is on the northeast). Comparisons on that date indicate some disparity between the data obtained by bag sampling (5.8 ppm) and by tape records (4.3 ppm), but only seven hours of records rather than 8 were available.

Figure 19 shows the pattern of CO at this location on the day of the maximum eight-hour tape average - about 7 ppm. Concentrations gradually decreased from 10:00 a.m. to 5:00 p.m., and then rose for 5:00 p.m. to 6:00 p.m. which probably encompassed the evening peak traffic. Although this may or may not have been typical of other days, it does suggest that vehicle emissions were at least partially responsible for the late afternoon increase in CO within the hotel. Unfortunately, no tape record was available for December 2, when indoor bag sampling showed an eight-hour average of about 10 ppm - above the standard for outdoor air. Recall that on this day, many outdoor sites experienced high carbon monoxide levels.

Figure 20 illustrates the data for the hospital site (BIN2) and the nearest outdoor site (29A) which was one street block south and on the opposite side of the street except on the first day November 25, 1977, when a nearer location was monitored. On the day when the highest indoor concentrations were observed (December 2), the hourly average concentrations began rising at noon and were greatest in the late afternoon. On this day, indoor concentrations were also high at the hotel site (previously discussed) and at other outdoor sites, which suggests a widespread phenomenon of higher emissions and/or less favorable meteorology for dispersion of pollutants.

At the building on the northeast corner of Ninth and Idaho, Site BIN3, data were obtained only for three days. Adequate strip chart records were obtained only on the day of the lowest eight-hour average (2.4 ppm). These hourly data are not plotted. However, comparisons between the outdoor site on Ninth north of Idaho (Site 11) and this indoor site are shown in Table 13. Data for site 32 (around the block on Idaho west of Eighth Street) appear for comparison, but do not seem to correlate as well with this indoor site. This was not surprising because it is thought that the major intake of air to this portion of the building was from the Ninth Street side.

Table 13. Bag Sample Data for Site BIN3 and Site 11

Eight-Hour Average CO, ppm

Date	Site BIN3 Indoors	Site 11 Outdoors	Site 32 Outdoors
12/6	10.8	13.3	11.1
12/7	2.4a	2.0	8.7
12/8	5.4	4.1	8.7

a. Indoor tape averaged 2.4 ppm, also.

For the small fabric shop (site BIN4) in the same street block as the state's permanent monitor and on the same (west) side of Ninth Street, only two days' of comparable indoor and outdoor data (Site 13) were obtained. On both days, concentrations indoors were less than outdoors*. Another day's strip chart record indicated an indoor eight-hour average of 6.4 ppm, but no eight-hour data were available then for Site 13.

Figure 21 shows corresponding indoor and outdoor carbon monoxide concentrations in bag samples for the sewing shop (site BIN5), and site 9. These sites are also in the same block as the state's monitor but across the street. Here, the highest indoor eight-hour average concentration, 10.8 ppm on December 12, 1977, was essentially the same as outdoors (10.9 ppm). Data from Site 13 and the State site indicated much lower concentrations just across the street (6.3 and 5.4 ppm, respectively) for that same day.

This non-uniformity of carbon monoxide concentrations within a single city block suggests that data from single monitoring sites needs careful evaluation. Although concentrations were relatively moderate at the state monitor, concentrations above 9.0 ppm were occurring across the street.

Figure 22 shows the general correspondence between indoor concentrations at the department store on Eighth north of Main (BIN6), and nearly equal to somewhat higher outdoor concentrations at Site 7. On December 22, when this site's highest indoor eight-hour average concentration (11.1 ppm) was observed, the hourly average rose from 10:00 a.m. to 3:00 p.m., dropped slightly between 3:00 p.m. to 5:00 p.m. and rose sharply from 5:00 p.m. to 6:00 p.m. to its highest recorded level (14.6 ppm). No data were available for the adjacent outdoor site on this day. However, the state site's highest eight-hour average during the survey for 10:00 a.m. to 6:00 p.m. (13.7 ppm) occurred then; the highest hourly average during that period was from 5:00 p.m. to 6:00 p.m. (23 ppm) and was over twice the hourly averages early in the period.

---

* On December 6, 1977, the indoor value was 5.8 compared to 7.2 ppm outdoors; on December 7, 1977, the indoor value was 4.2 ppm compared to 6.5 ppm outdoors.

SUMMARY

The data strongly suggest a close relationship between increases in indoor concentrations and in outdoor concentrations nearby. For the selected pairs of study sites, the indoor concentrations were usually lower, sometimes nearly equal, and rarely higher. Even on the highest floor of a six-story building, indoor concentrations may occasionally equal or exceed the outdoor standard (site BIN1) as was also true for the main floors of a large department store (site BIN6) and of a small shop (site BIN5) and the second floor of another building (Site BIN3). The rise in indoor CO concentrations in the late afternoon suggests traffic emission influences.

CONCLUSIONS AND RECOMMENDATIONS

The brief study in Boise at paired outdoor and indoor sites with insignificant indoor generation of CO suggests the following conclusions:

1. Population exposure to carbon monoxide concentrations within buildings is likely to increase with increased traffic emissions of CO.
2. Frequently the changes in nearby outdoor concentrations are reflected by changes in indoor concentrations of CO. Concentrations are usually lower indoors.

3. The relationship of outdoor to indoor concentrations is not constant. It may vary from site pair to site pair and from day-to-day.
4. Indoors, the eight-hour average concentration of carbon monoxide may exceed 9.0 ppm at times.

The following recommendation is also based on the indoor/outdoor part of the study:

For outdoor sites where the CO standard is violated, the possibility of similar indoor concentrations within nearby buildings should be considered if assessing the population exposure represented by the monitor. (The variable relationship of outdoor to indoor levels should be kept in mind).

PEDESTRIAN ROUTES

A minor effort to characterize breathing air of pedestrians within the Boise central business area was also undertaken during the survey of outdoor sites. This section describes the method of study and discusses results. Because the sampling periods were variable (two to four hours long), data are not strictly comparable to data from the outdoor sites in most cases.

METHOD OF STUDY

Two individuals were instructed to choose separate routes within a defined area of the city as an ordinary pedestrian might choose to do. These separate routes (designated "A" and "B") were always within the area between Washington and Myrtle Streets and 5th and 16th Streets. For the last 10 days, sub-areas were such that route A was west of 9th and east of 16th Streets. Route B was east of 9th and west of 5th Streets. Both were between Washington and Front Streets. Each individual marked his/her exact route for each period on a map and completed a record sheet to note times and locations, especially of times spent inside buildings in the area.

Carbon monoxide levels were obtained by two methods for two periods daily. For Route A, the "AM" period was generally from about 11:00 a.m. through 1:30 p.m. (about 2½ hours); the "PM" period was generally from about 2:30 a.m. through 5:30 p.m. (also 2½ hours). For Route B, the "AM" period was generally from about 9:45 a.m. through 1:30 p.m. (about 3½ hours) and the "PM" period from 1:40 p.m. to 5:20 p.m. (about 3½ hours). Although there were several exceptions, the total sampling time represented by the average of the AM and PM samples was typically about 5½ hours on Route A and about 7½ hours on Route B. Time differences were due to the contractor's need of these same sampling personnel for other duties during the day. However, the study plan had been to collect samples along pedestrian routes at the same time that the outdoor stations were operating and, if followed, this would have facilitated data evaluations.

The two methods of obtaining data were: (1) bag sampling using the same type of pump employed at the stationary outdoor sites; and (2) instantaneous analysis using a portable CO personnel monitor (Hipster 6000, Energetics Science, Inc., Elmsford, New York). The principal method involved collection of an integrated air sample at a few inches below the breathing level as the person traversed the area. He/she also carried the portable analyzer and observed readings of the analyzer for a few minutes about every twenty minutes to determine the maximum, minimum, and "average" concentration at the location which was then recorded on the field sheet. Individuals were permitted to spend some time inside buildings, but instructed to avoid cigarette and cigar smoke as these extraneous sources of carbon monoxide are unrelated to vehicular emissions. In some instances, the sample pump was briefly turned off to avoid such smoke.

Review of the field records indicated frequent difficulties in maintaining calibration of the portable analyzer throughout the sampling period and often field personnel failed to record calibrations at the end of the sampling period. Consequently, the detailed portable analyzer data is not presented in this report as few adequate records were obtained.

RESULTS AND DISCUSSION

Correlations between Route A and Route B samples for morning, afternoon, and combined averages of morning and afternoon samples were examined. A surprisingly high degree of correlation between the combined averages was indicated (Table 14) in view of the differences on each day between the time periods and locations of samples of Route A and Route B as well as the day-to-day variations in the length of samples (particularly on Route A) and location. The linear regression equation for the daily combined average of morning and afternoon samples from Route A (AAV) expressed as a function of the daily combined average from Route B (BAV) explained about 85% of the variation in the data (square of the correlation coefficient = .85 with a 95% confidence interval of about 0.64 to 0.94). Correlations between routes for the same part of the day (AAM vs BAM and APM vs BPM) were greater than between parts of the day for the same route (AAM vs APM and BAM vs BPM). This suggests that influences such as meteorological and traffic conditions varied between morning and afternoon in a less consistent manner than such influences varied within a particular two to four hour period in the morning (or afternoon) throughout the downtown area. The higher correlations of the combined averages also suggests that variations in carbon monoxide exposure to pedestrians who traverse the area of downtown Boise studied here are more dependent on the particular day (and, perhaps, individual) than upon the particular route.

Samples were not of constant duration from day to day. The measured concentrations ranged from about 3.9 ppm (Route B - 12/13/77 AM sample) to 14.0 ppm (Route A - 11/25/77 - PM sample). The difference between averages of morning samples for Route A and Route B never exceeded 2 ppm and seldom exceeded

Table 14. Regression Equations For Pedestrian Data

Relationship No. Regression Eq.	No. of Data Pairs	Index[1] R-SQ	95% CI[2] R-SQ	95% CI A	95% CI B
1. AAM= 1.85 + .70APM	18	.46	.1 -.7	1.00 - 2.70	0.30 - 1.09
2. BAM = 2.17 + .55BPM	18	.37	.03 -.7	2.04 - 2.30	0.19 - 0.92
3. AAM = 1.1 + .90BAM	18	.70	.4 -.9	0.44 - 1.77	0.59 - 1.2
4. APM = 1.98 + .72BPM	17	.73	.4 - .9	1.35 - 2.61	0.47 - 0.97
5. AAV = .96 + .88BAV	17	.85	.64 - .94	0.52 - 1.39	0.68 - 1.09

---

1. The square of the correlation coefficient, R-SQ, for the linear regression equation.
2. The values for the 95% confidence intervals for R-SQ were interpolated from a table of confidence intervals for R and based on the number of data pairs used for formulation of the regression equation.

Note: AAM - Morning samples on Route A
BAM - Morning samples on Route B
APM - Afternoon samples on Route A
BPM - Afternoon samples on Route B
AAV - Average of AAM and APM
BAV - Average of BAM and BPM

1.0 ppm. The same was true for afternoon samples. This suggests examination of whether individual behavior patterns in traversing the area have relatively little effect on the carbon monoxide exposures.

It should be remembered that the pedestrian samples were not necessarily collected during the evening peak traffic. Unfortunately, the way the contractor carried out this part of the study did not permit easy comparisons. For future studies, it is recommended that a minimum of two persons and four pumps be allocated on a full-time basis to a similar pedestrian exposure study of two routes. Sampling periods should remain fixed from day-to-day and routes should be well-defined in advance as to the amount of time to be spent in a certain area. (In this study, three persons conducted all sampling and analytical work for both the pedestrian, outdoor, and indoor sites.)

For the pedestrian data from the November - December 1977 survey, the most important conclusions are:

1. For sampling periods ranging from about two to four hours, the carbon monoxide exposures of individuals acting as ordinary pedestrians varied from 3.9 ppm to 14 ppm.

2. On some days the average carbon monoxide exposure for an eight-hour period may exceed 9.0 ppm for a pedestrian visiting buildings in the downtown area. This is suggested by averages equal or above 9.0 ppm for nearly sequential sampling periods totaling seven hours or more on each of four days (11/25, 11/29, 12/6, and 12/22).

RECOMMENDATIONS

1. If another study of pedestrian exposure using small pumps and bags is undertaken, the data should again be gathered during the late fall or winter. Periods of expected traffic congestion from Christmas shopping should again be examined as values would be expected to be higher then.

2. Such a study should attempt to characterize carbon monoxide concentrations on a one-hour (clock-hour basis) so that data may be correlated with the state's permanent monitor. A consecutive eight hours should be examined each day.

3. Routes should be well-defined in advance both as to location and duration of traversing the route. This will at least eliminate these factors as variables.

4. Field crew records should be checked daily for completeness and accuracy by the field manager.

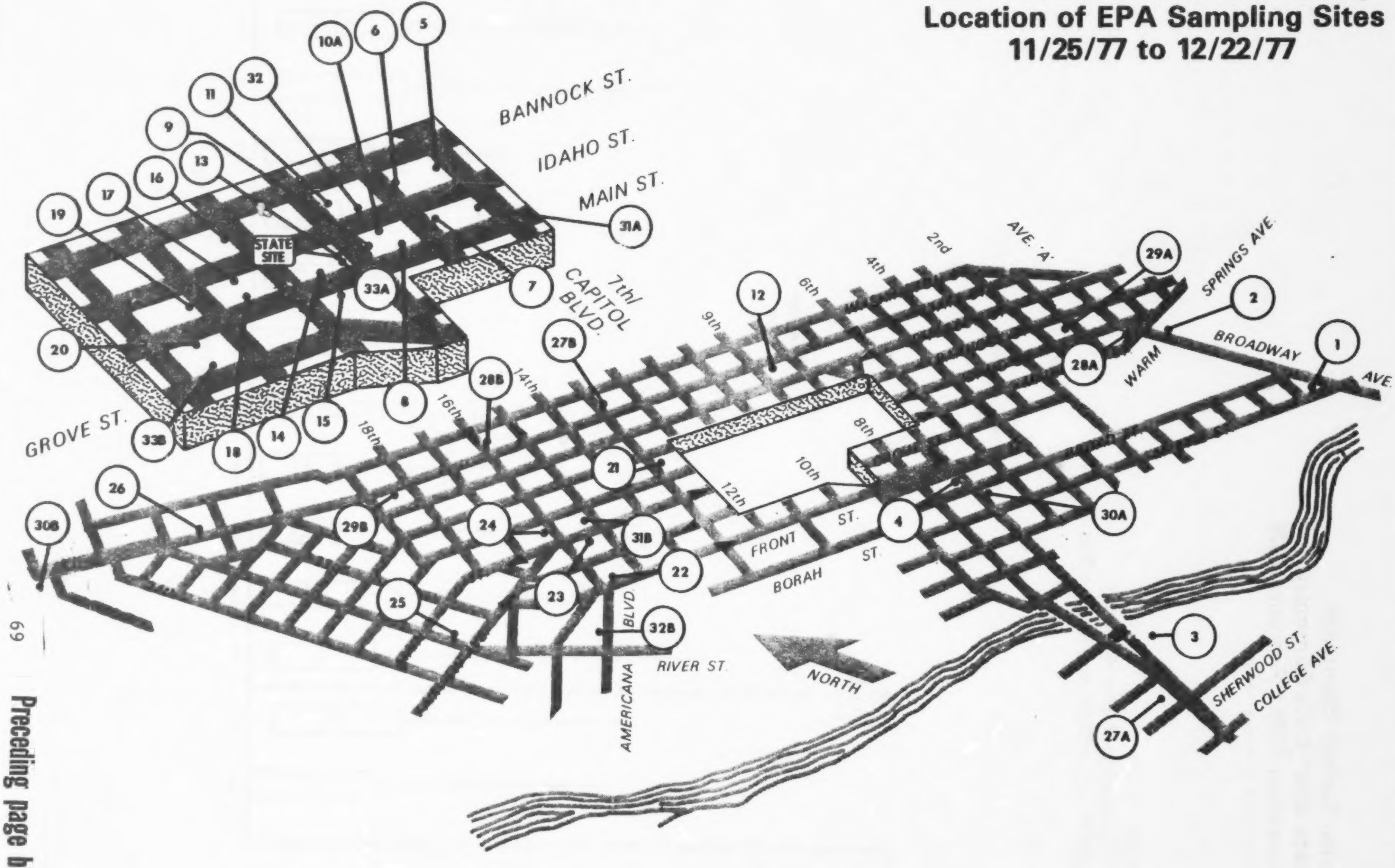
5. If selected for use, the portable analyzers should be calibrated at a minimum of hourly. Annotated strip chart records should be obtained for each set of readings.

6. Bag sampling would be preferred as the equipment is simpler to operate and it is simpler to reduce data from analyses of integrated samples than from strip chart recordings.

FIGURES

FIGURE 1

Boise Carbon Monoxide Study
Location of EPA Sampling Sites
11/25/77 to 12/22/77


BANNOCK ST.
IDAHO ST.
MAIN ST.
7th/ CAPITOL BLVD.
GROVE ST.
STATE SITE
2nd
4th
6th
9th
14th
16th
18th
8th
10th
12th
AVE. 'A'
SPRINGS AVE.
BROADWAY AVE.
WARM
FRONT ST.
BORAH ST.
AMERICANA BLVD.
RIVER ST.
SHERWOOD ST.
COLLEGE AVE.
NORTH
1
2
3
4
5
6
7
8
9
10A
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27A
27B
28A
28B
29A
29B
30A
30B
31A
31B
32
32B
33A
33B

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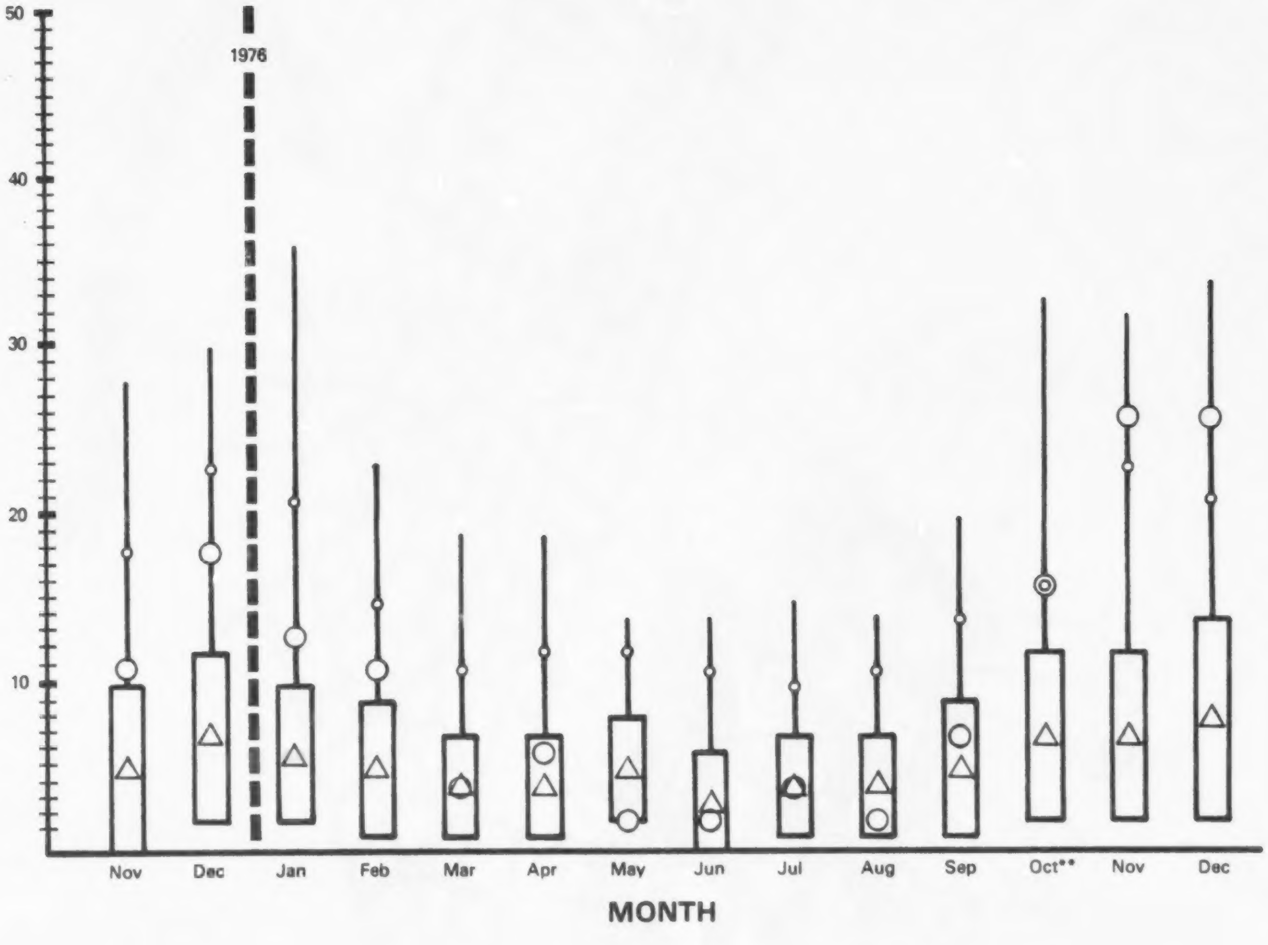
Boise Carbon Monoxide State Site* Data Summary November 1975 - February 1978

*Located at 115½ N. 9th (Odd Fellows Building)

Figure 2
Characteristics of One-Hour and Eight-Hour Averages at the State Site



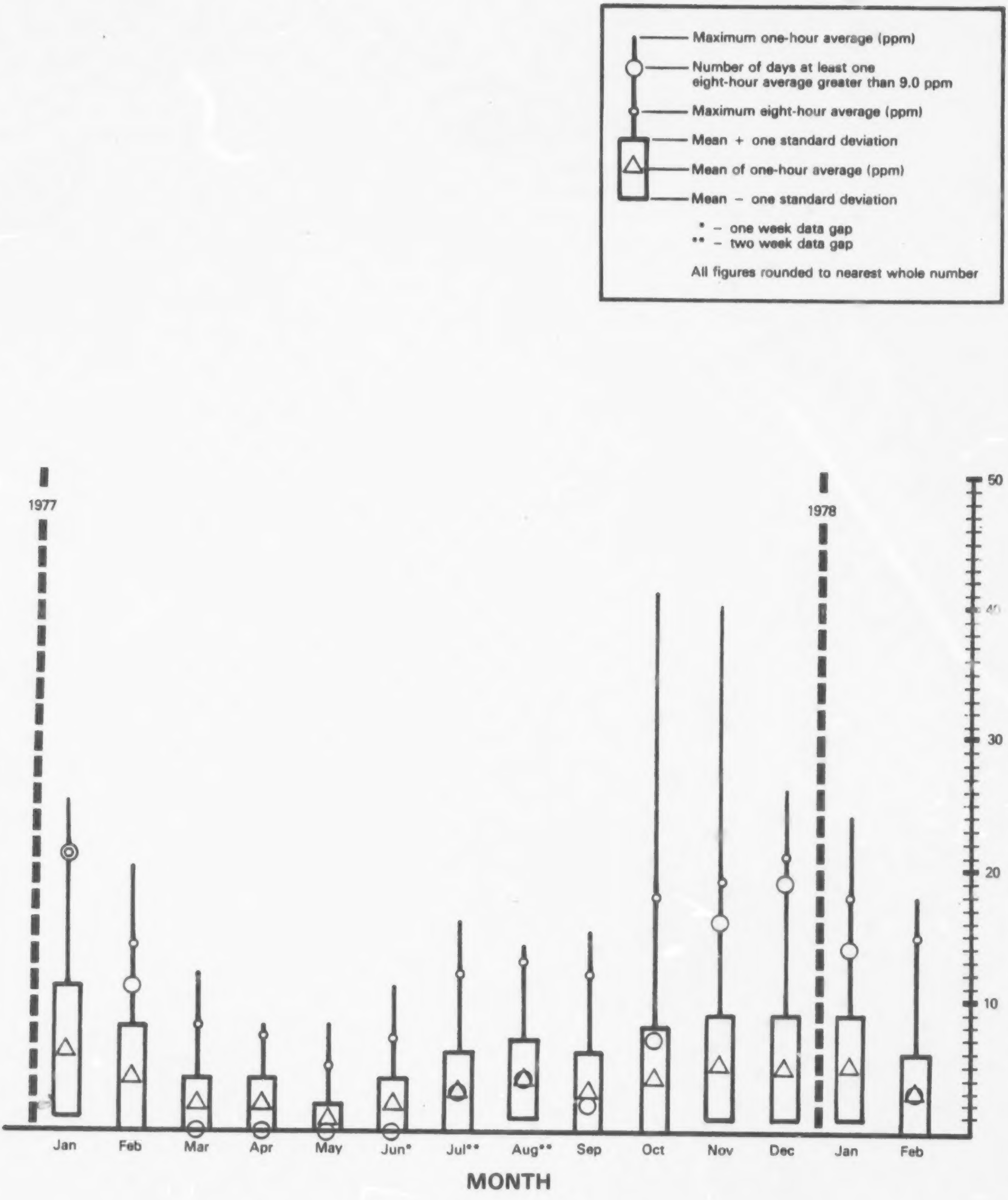
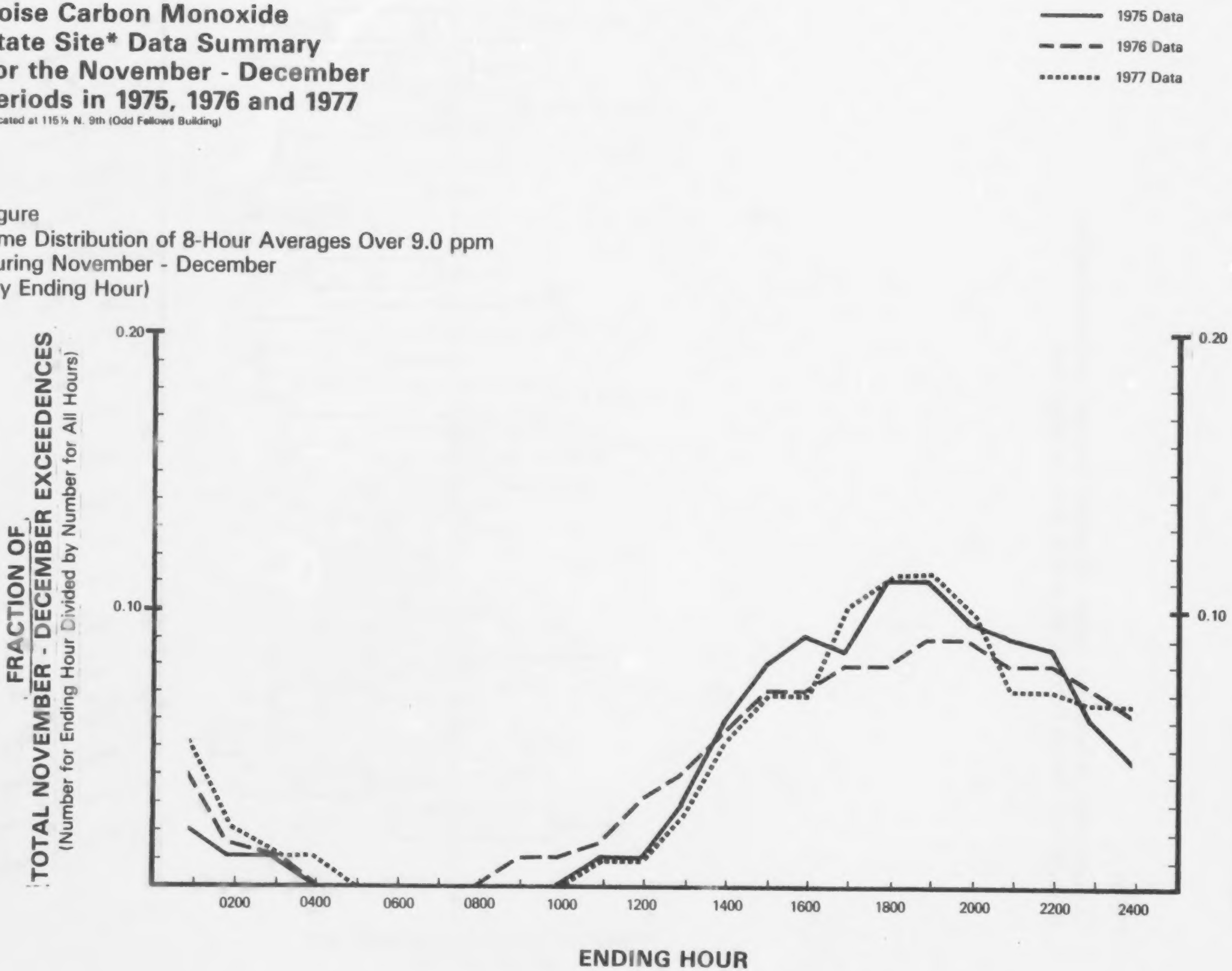

Maximum one-hour average (ppm)
Number of days at least one eight-hour average greater than 9.0 ppm
Maximum eight-hour average (ppm)
Mean + one standard deviation
Mean of one-hour average (ppm)
Mean − one standard deviation
* – one week data gap
** – two week data gap
All figures rounded to nearest whole number
1977
1978
50
40
30
20
10
Jan
Feb
Mar
Apr
May
Jun*
Jul**
Aug**
Sep
Oct
Nov
Dec
Jan
Feb
MONTH

FIGURE 3

Boise Carbon Monoxide State Site* Data Summary For the November - December Periods in 1975, 1976 and 1977

*Located at 115½ N. 9th (Odd Fellows Building)

Figure
Time Distribution of 8-Hour Averages Over 9.0 ppm
During November - December
(By Ending Hour)



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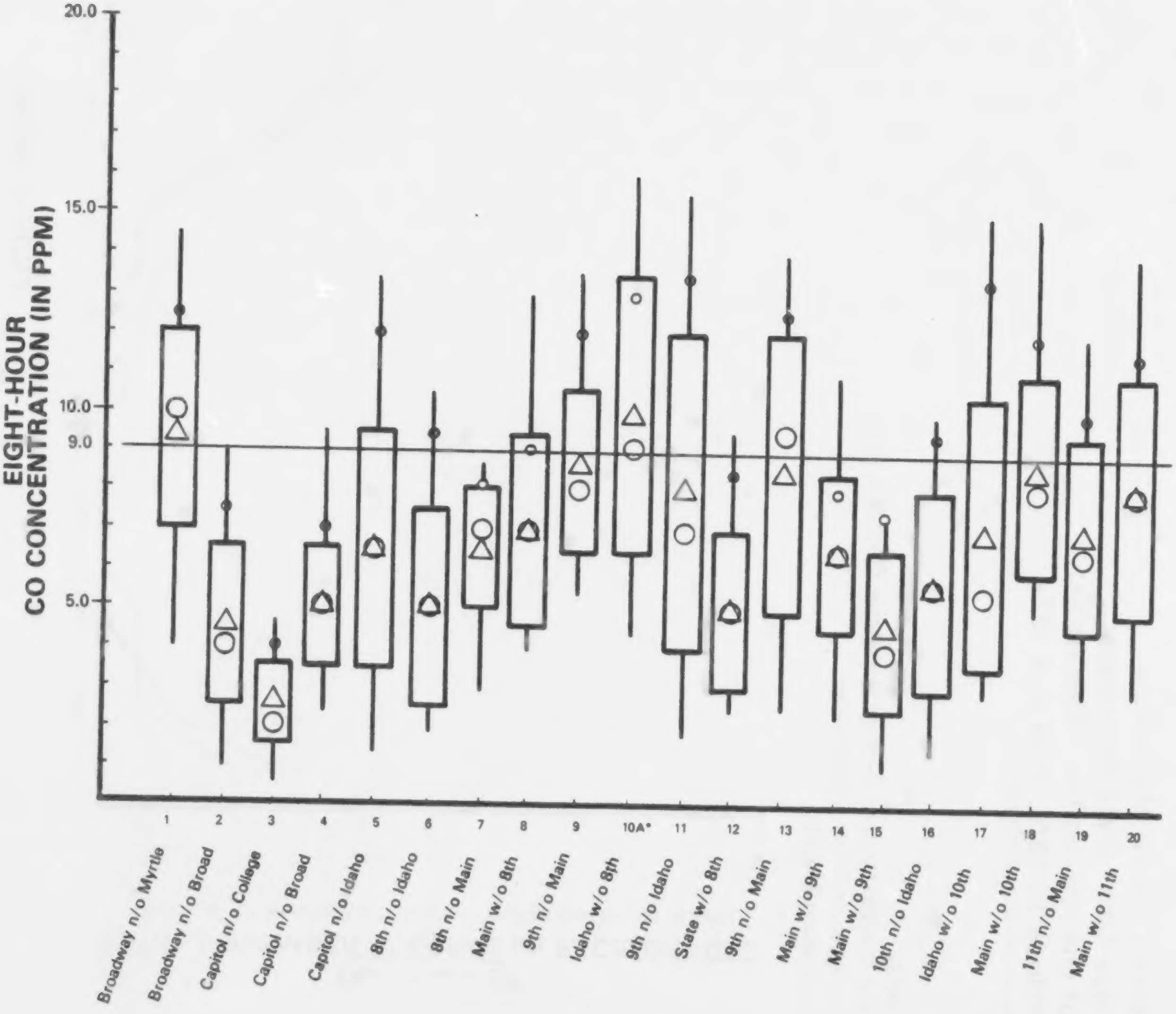
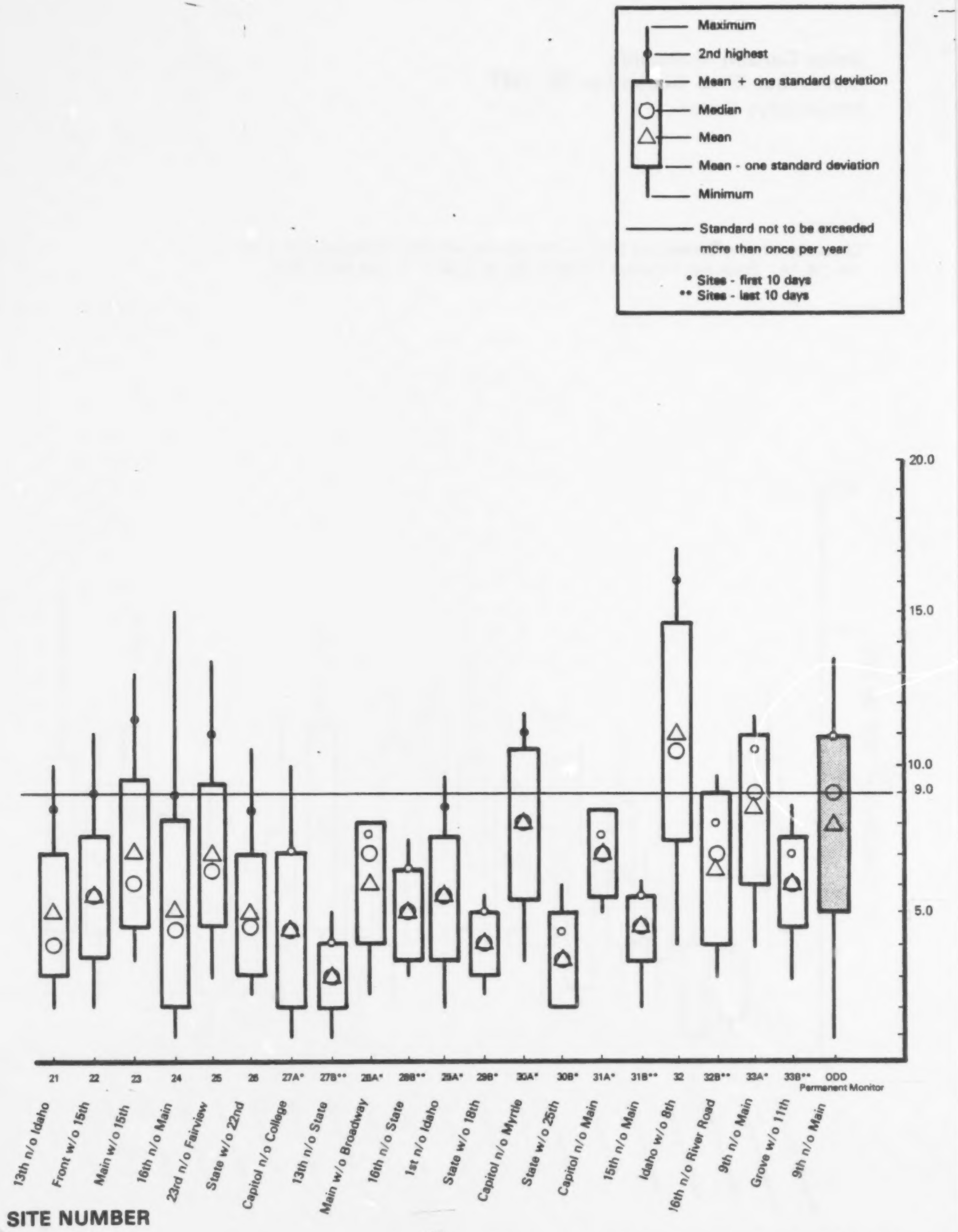
Boise Carbon Monoxide
November 25 to December 22, 1977
(Weekdays Only)

FIGURE 4

Characteristics of Weekday Carbon Monoxide Average Concentrations for an Eight-Hour Period (10:00 A.M. to 6:00 P.M.) at Each Site.

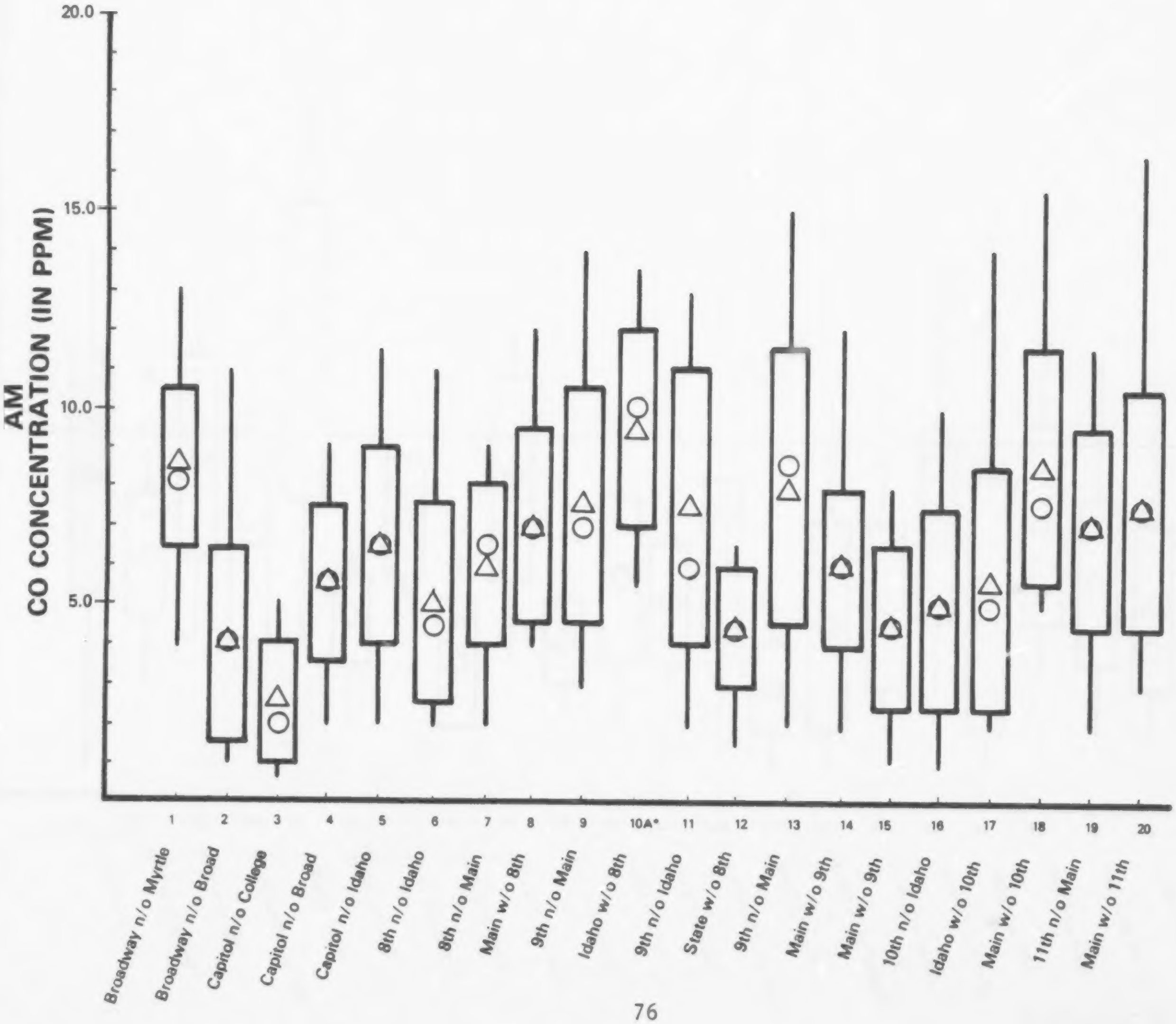


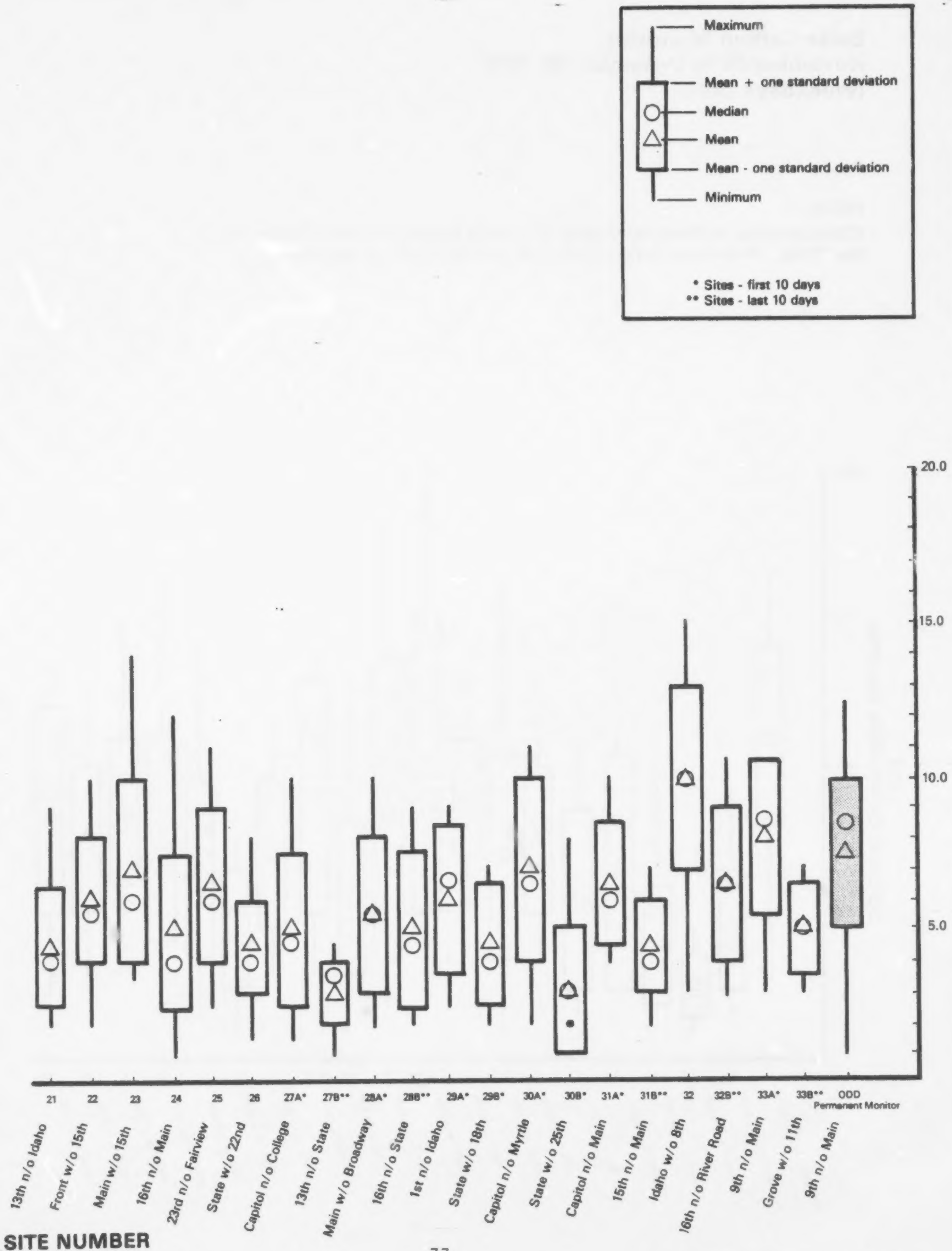


Note: Number of successful samples varies from site to site

Boise Carbon Monoxide
November 25 to December 22, 1977
(Weekdays Only)

FIGURE 5
Characteristics of Weekday Carbon Monoxide Average Concentrations for the "A.M." Four-Hour Period (10:00 A.M. to 2:00 P.M.) at Each Site.



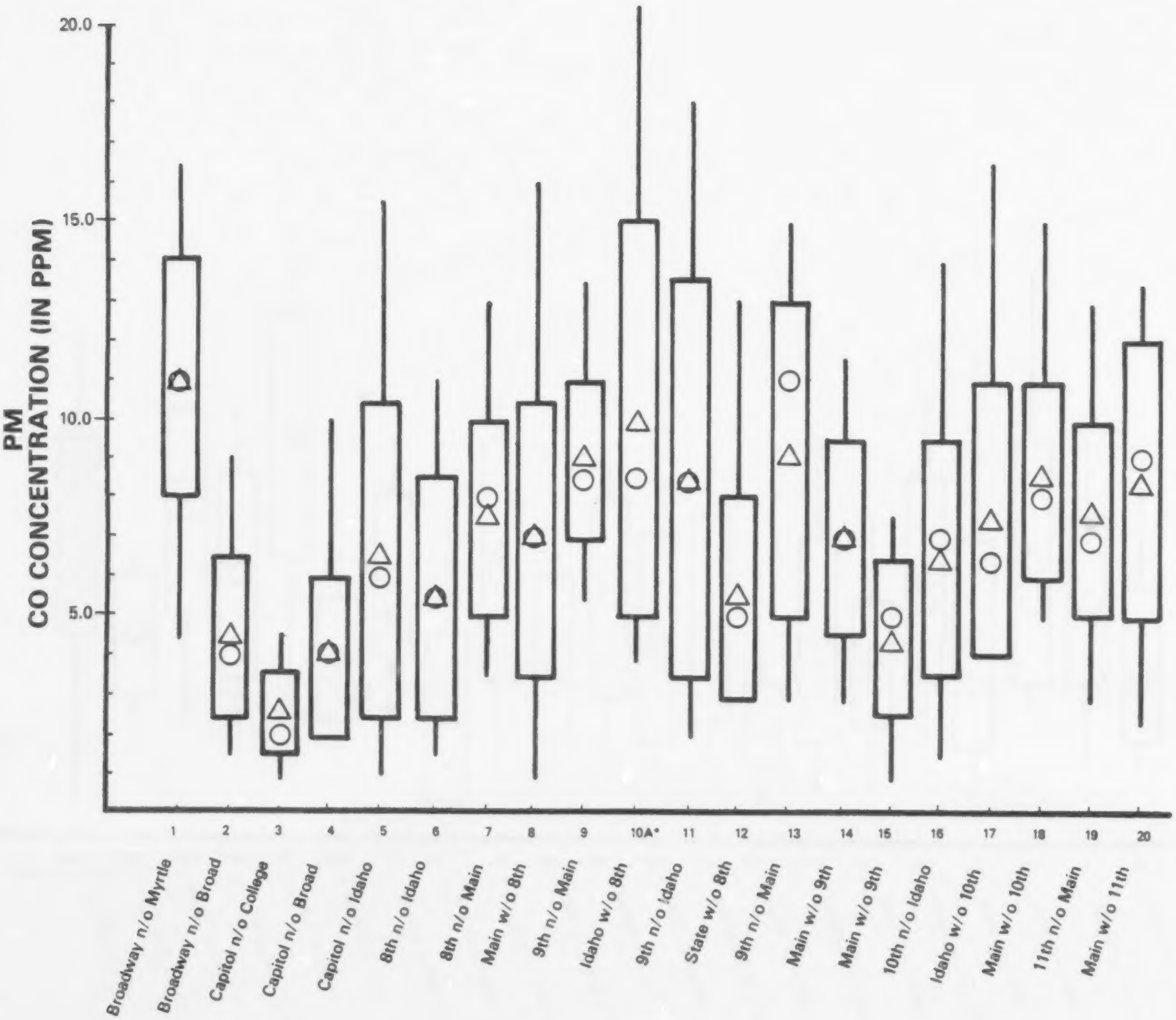


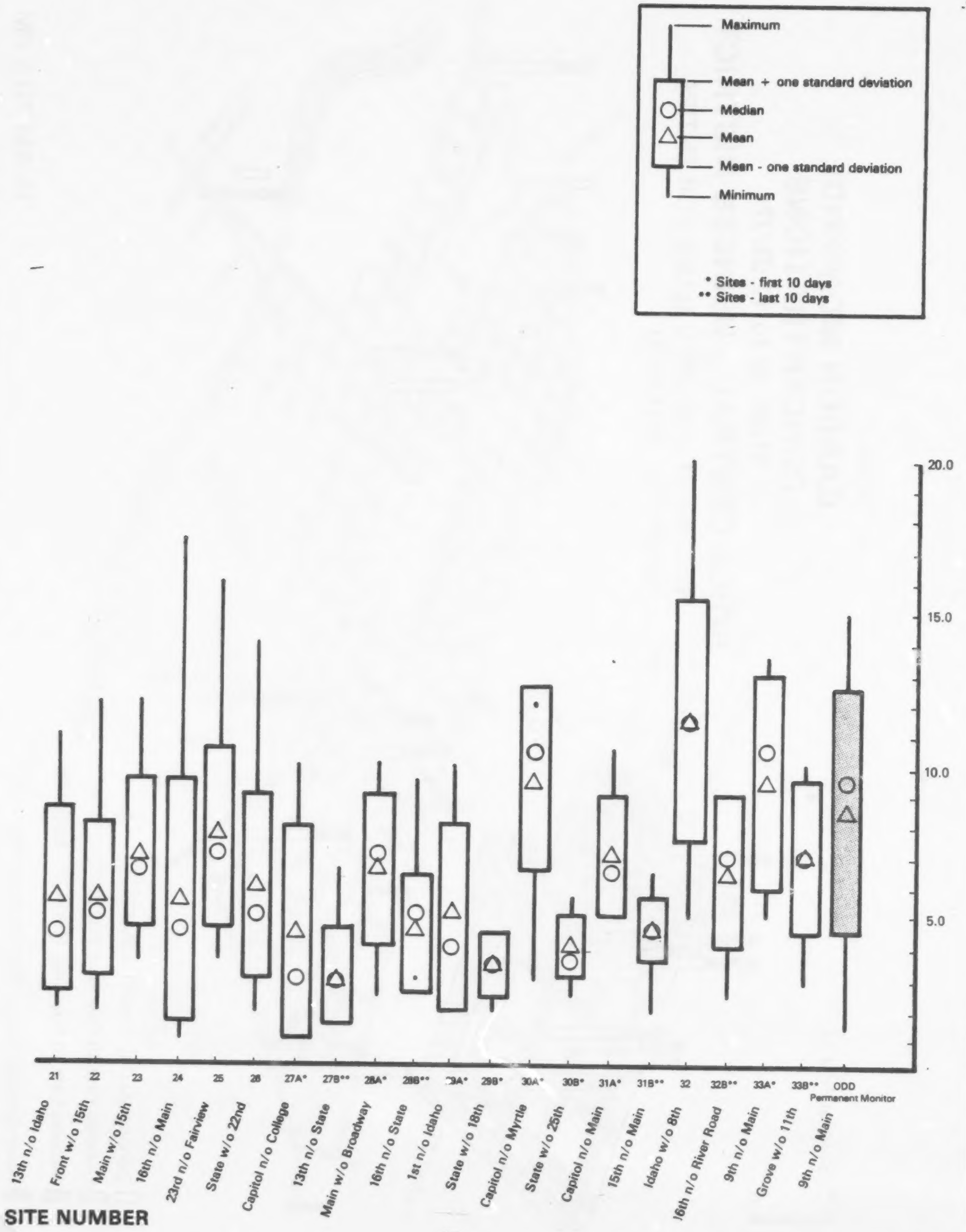
Note: Number of successful samples varies from site to site

Boise Carbon Monoxide
November 25 to December 22, 1977
(Weekdays Only)

FIGURE 6

Characteristics of Weekday Carbon Monoxide Average Concentrations foı the "P.M." Four-Hour Period (2:00 P.M. to 6:00 P.M.) at Each Site.

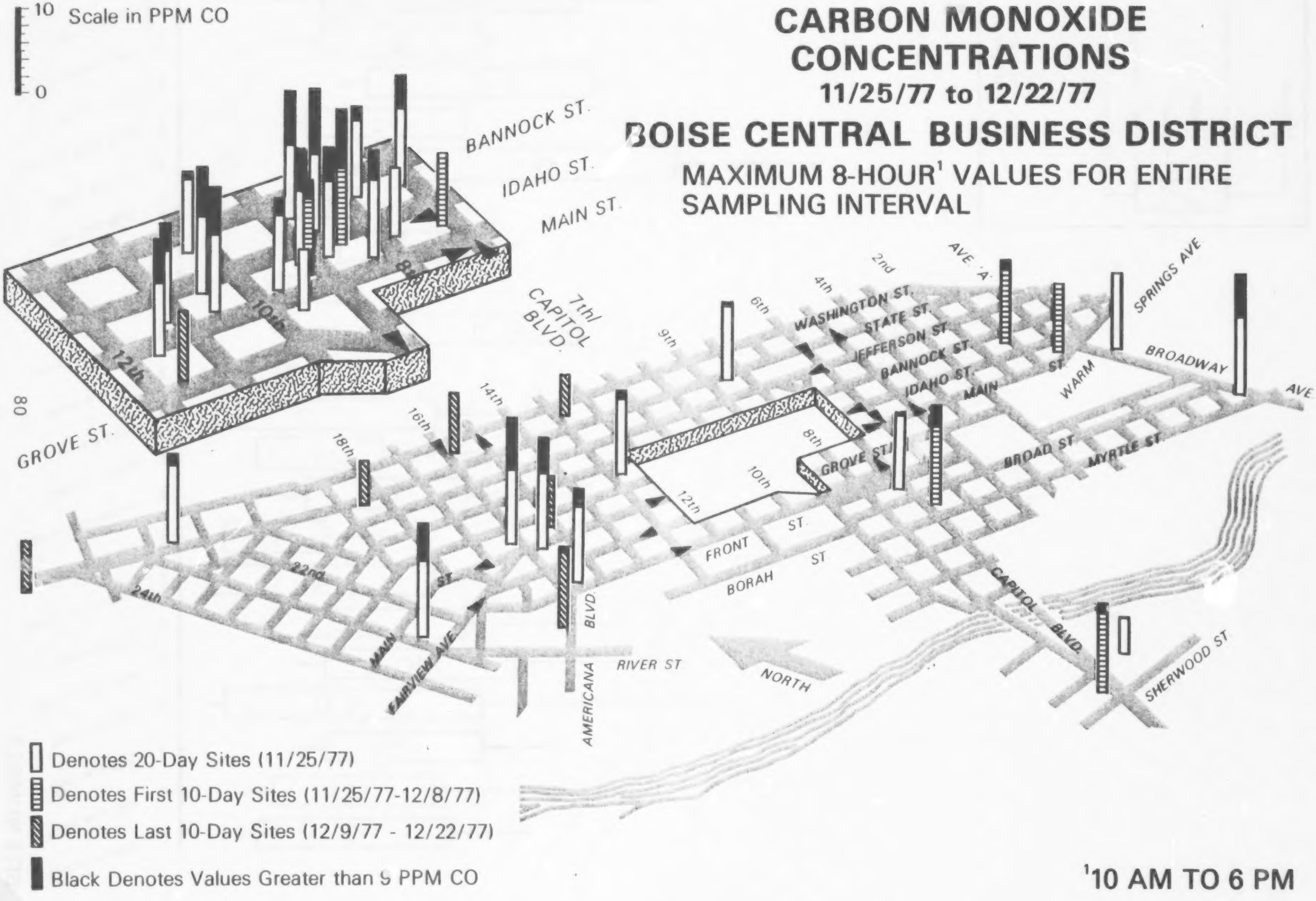




Note: Number of successful samples varies from site to site

FIGURE 7

CARBON MONOXIDE CONCENTRATIONS
11/25/77 to 12/22/77
BOISE CENTRAL BUSINESS DISTRICT
MAXIMUM 8-HOUR[1] VALUES FOR ENTIRE SAMPLING INTERVAL


10 Scale in PPM CO
0
BANNOCK ST.
IDAHO ST.
MAIN ST.
7th/ CAPITOL BLVD.
12th
10th
8th
GROVE ST.
9th
6th
4th
2nd
AVE 'A'
SPRINGS AVE
BROADWAY
AVE
WASHINGTON ST.
STATE ST.
JEFFERSON ST.
BANNOCK ST.
IDAHO ST.
MAIN
ST.
WARM
BROAD ST.
MYRTLE ST.
GROVE ST.
8th
10th
12th
14th
16th
18th
22nd
24th
FRONT ST.
BORAH ST
CAPITOL BLVD.
SHERWOOD ST.
NORTH
RIVER ST.
AMERICANA BLVD.
MAIN ST.
FAIRVIEW AVE

- ▯ Denotes 20-Day Sites (11/25/77)
- ▤ Denotes First 10-Day Sites (11/25/77-12/8/77)
- ▨ Denotes Last 10-Day Sites (12/9/77 - 12/22/77)
- ▮ Black Denotes Values Greater than 9 PPM CO

[1] 10 AM TO 6 PM

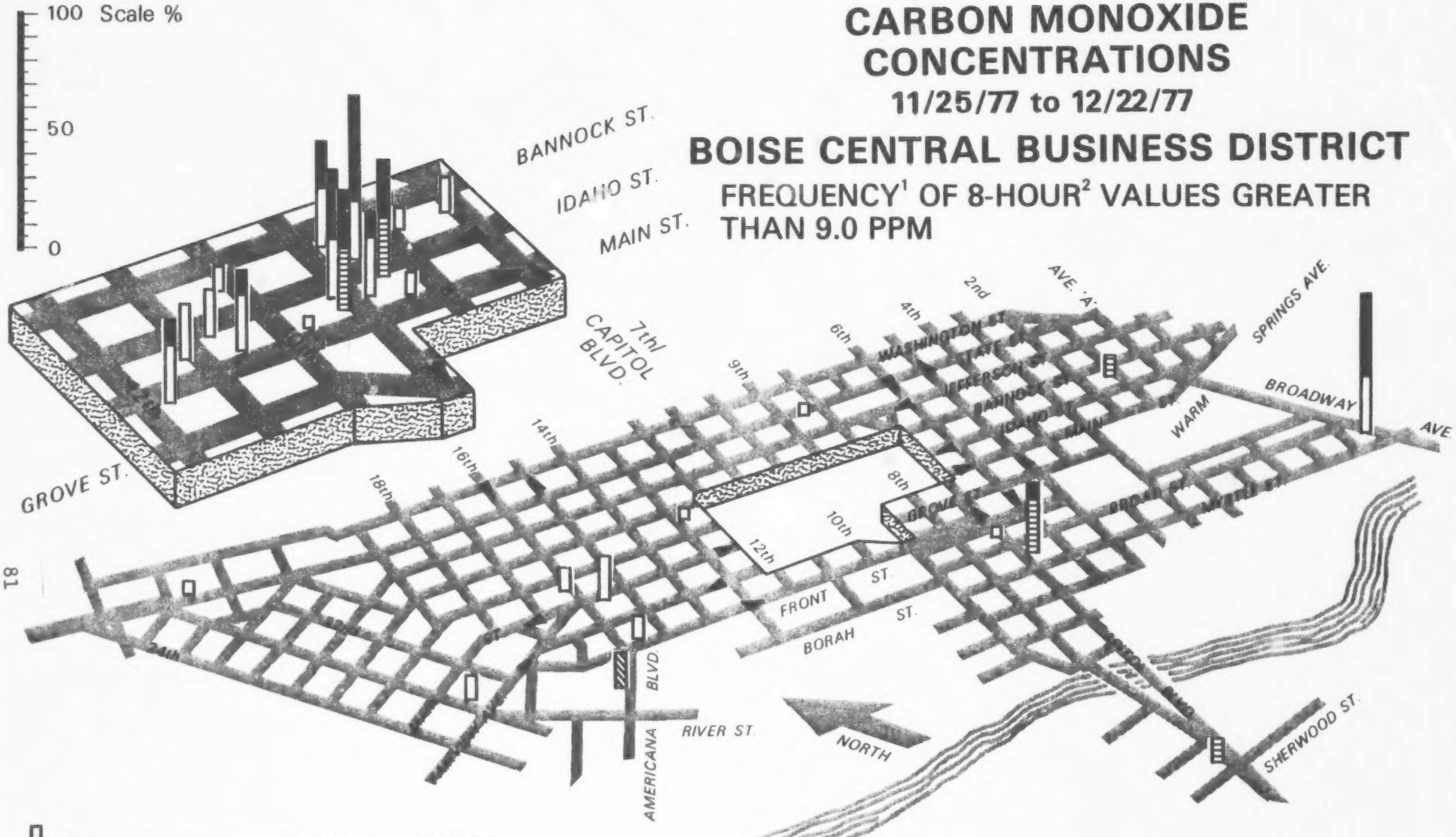
FIGURE 8

CARBON MONOXIDE CONCENTRATIONS

11/25/77 to 12/22/77

BOISE CENTRAL BUSINESS DISTRICT

FREQUENCY[1] OF 8-HOUR[2] VALUES GREATER THAN 9.0 PPM


100 Scale %
50
0
BANNOCK ST.
IDAHO ST.
MAIN ST.
7th/ CAPITOL BLVD.
GROVE ST.
2nd
4th
6th
9th
14th
16th
18th
24th
AVE. 'A'
SPRINGS AVE.
BROADWAY
AVE.
WARM
WASHINGTON ST.
STATE ST.
JEFFERSON ST.
BANNOCK ST.
IDAHO ST.
MAIN ST.
GROVE ST.
BROAD ST.
MYRTLE ST.
8th
10th
12th
FRONT ST.
BORAH ST.
BLVD.
AMERICANA
RIVER ST.
NORTH
CAPITOL BLVD.
SHERWOOD ST.

▯ Denotes 20-Day Sites (11/25/77 - 12/22/77)

▤ Denotes First 10-Day Sites (11/25/77-12/8/77)

▨ Denotes Last 10-Day Sites (12/9/77 - 12/22/77)

■ Black Denotes Frequencies Greater than 25%

[1]ROUNDED TO NEAREST 5%
[2]10 AM TO 6 PM

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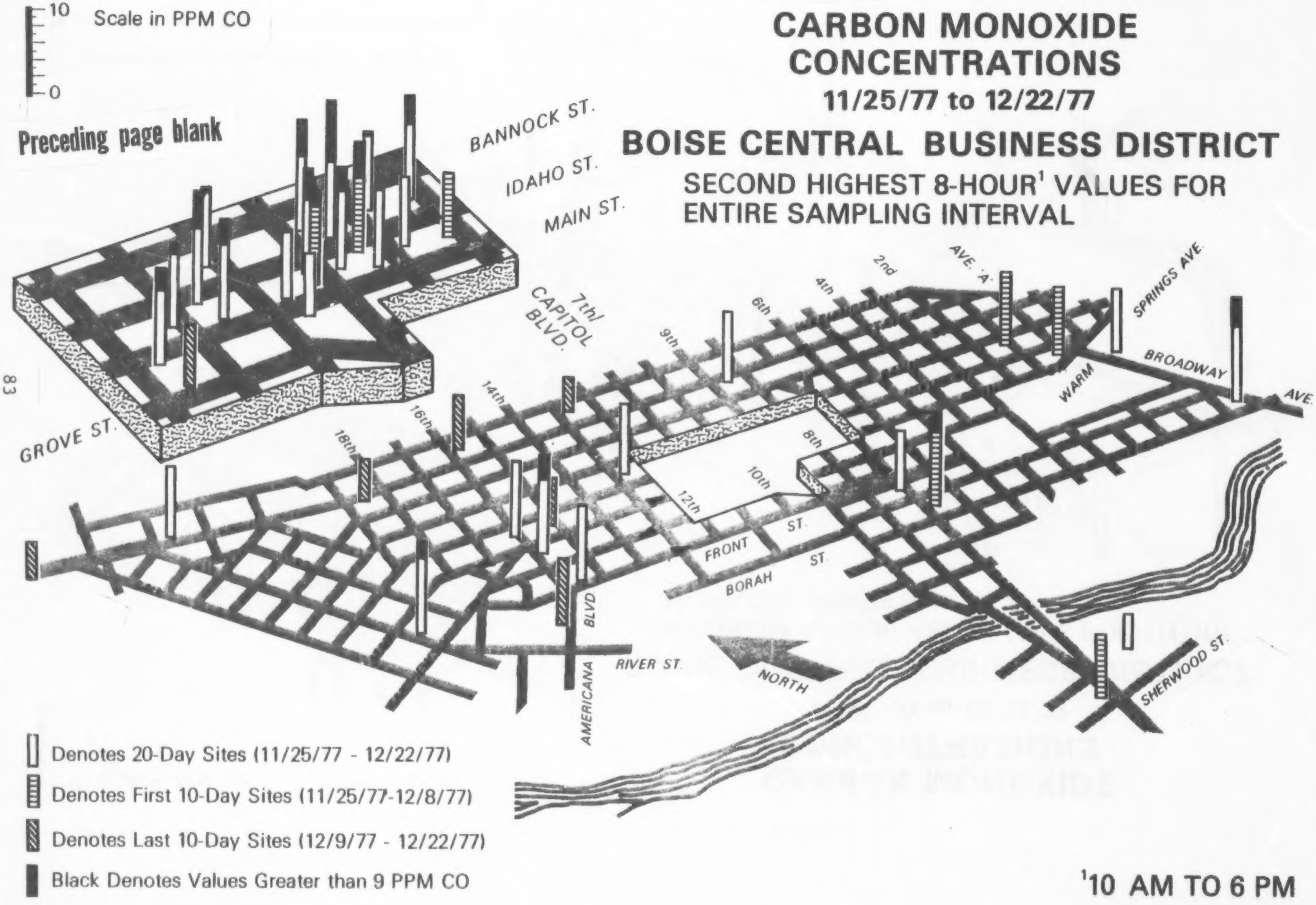
FIGURE 9

CARBON MONOXIDE CONCENTRATIONS

11/25/77 to 12/22/77

BOISE CENTRAL BUSINESS DISTRICT

SECOND HIGHEST 8-HOUR[1] VALUES FOR ENTIRE SAMPLING INTERVAL


10
0
Scale in PPM CO
BANNOCK ST.
IDAHO ST.
MAIN ST.
7th/ CAPITOL BLVD.
GROVE ST.
18th
16th
14th
12th
10th
9th
8th
6th
4th
2nd
AVE. 'A'
SPRINGS AVE
WARM
BROADWAY
AVE.
FRONT
ST.
BORAH
ST.
BLVD
AMERICANA
RIVER ST.
NORTH
SHERWOOD ST.

▯ Denotes 20-Day Sites (11/25/77 - 12/22/77)

▥ Denotes First 10-Day Sites (11/25/77-12/8/77)

▨ Denotes Last 10-Day Sites (12/9/77 - 12/22/77)

■ Black Denotes Values Greater than 9 PPM CO

[1] 10 AM TO 6 PM

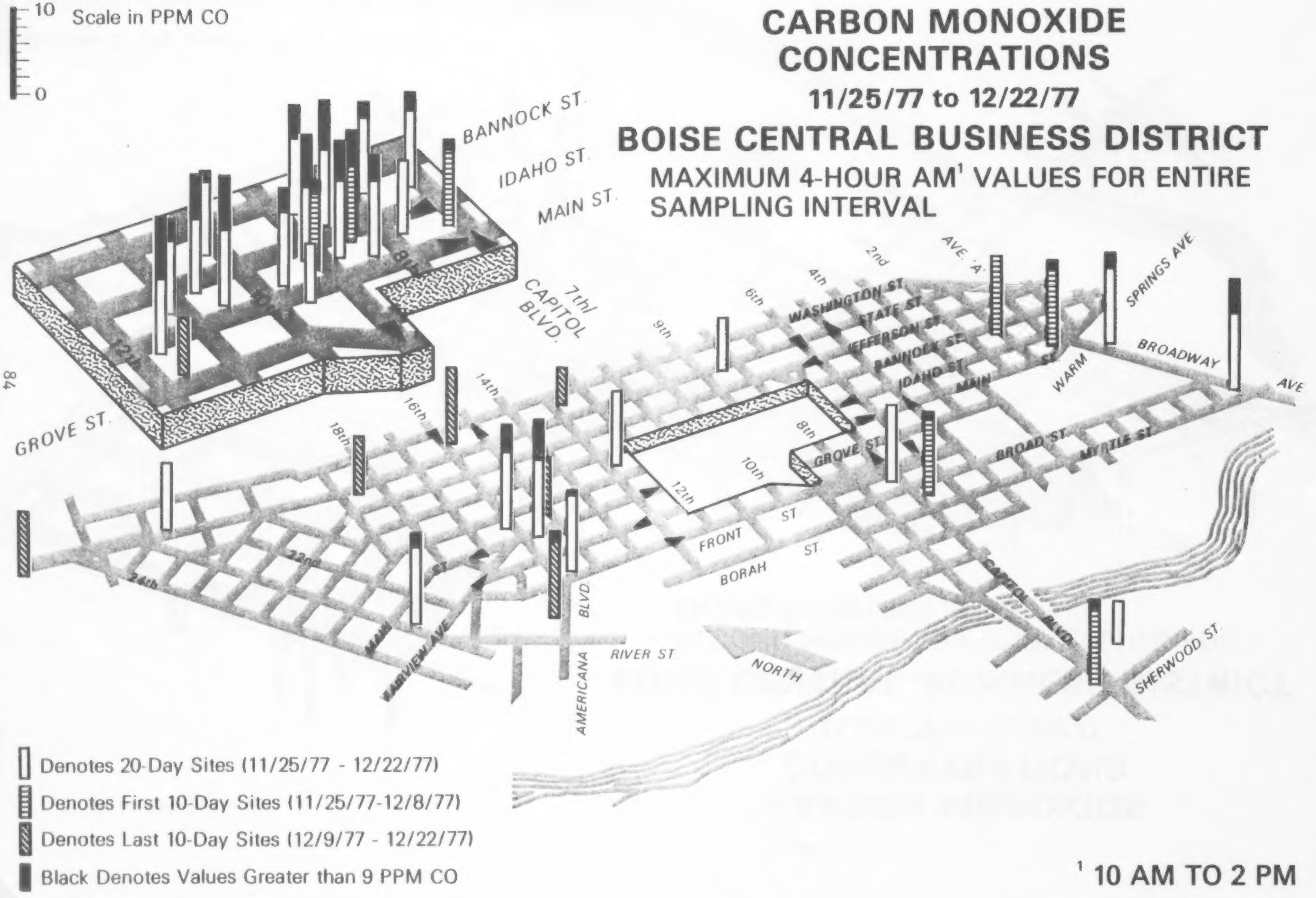
FIGURE 10

CARBON MONOXIDE CONCENTRATIONS

11/25/77 to 12/22/77

BOISE CENTRAL BUSINESS DISTRICT

MAXIMUM 4-HOUR AM[1] VALUES FOR ENTIRE SAMPLING INTERVAL


10
Scale in PPM CO
0
BANNOCK ST.
IDAHO ST.
MAIN ST.
7th/ CAPITOL BLVD.
8th
10th
12th
GROVE ST.
14th
16th
18th
9th
6th
4th
2nd
AVE. 'A'
WASHINGTON ST.
STATE ST.
JEFFERSON ST.
BANNOCK ST.
IDAHO ST.
MAIN
ST.
WARM
SPRINGS AVE
BROADWAY
AVE
8th
10th
12th
GROVE ST.
BROAD ST.
MYRTLE ST.
FRONT ST
BORAH ST.
CAPITOL BLVD.
SHERWOOD ST.
NORTH
RIVER ST
AMERICANA BLVD.
FAIRVIEW AVE
MAIN
ST
22nd
24th
▯ Denotes 20-Day Sites (11/25/77 - 12/22/77)
▤ Denotes First 10-Day Sites (11/25/77-12/8/77)
▨ Denotes Last 10-Day Sites (12/9/77 - 12/22/77)
■ Black Denotes Values Greater than 9 PPM CO

[1] 10 AM TO 2 PM

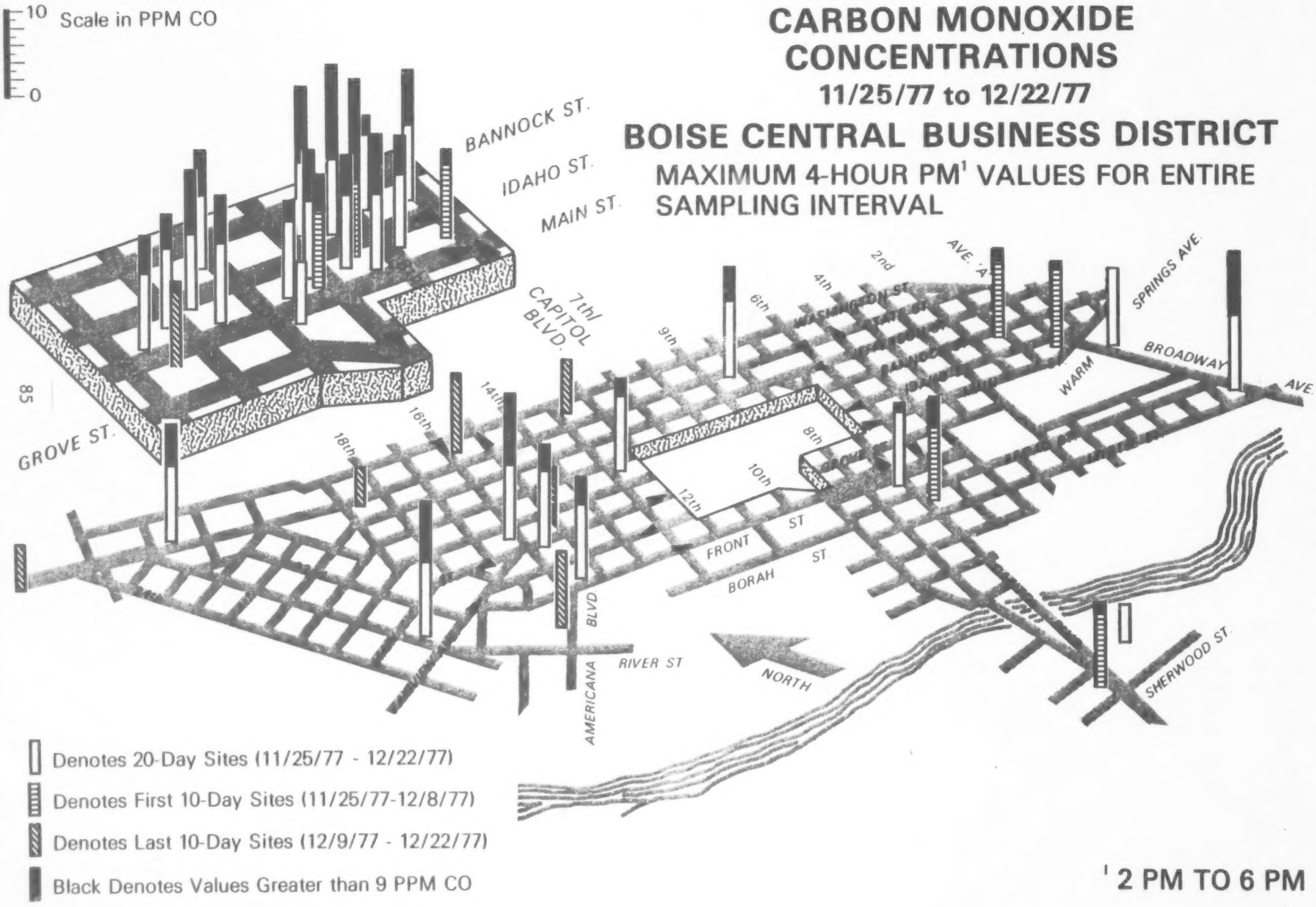
FIGURE 11

CARBON MONOXIDE CONCENTRATIONS

11/25/77 to 12/22/77

BOISE CENTRAL BUSINESS DISTRICT

MAXIMUM 4-HOUR PM[1] VALUES FOR ENTIRE SAMPLING INTERVAL



10 Scale in PPM CO
0
BANNOCK ST.
IDAHO ST.
MAIN ST.
GROVE ST.
7th/ CAPITOL BLVD.
9th
6th
4th
2nd
AVE. 'A'
WASHINGTON ST.
SPRINGS AVE.
BROADWAY
AVE.
WARM
14th
16th
18th
8th
10th
12th
FRONT ST
BORAH ST
BLVD
AMERICANA
RIVER ST
NORTH
SHERWOOD ST.

▯ Denotes 20-Day Sites (11/25/77 - 12/22/77)

▤ Denotes First 10-Day Sites (11/25/77-12/8/77)

▨ Denotes Last 10-Day Sites (12/9/77 - 12/22/77)

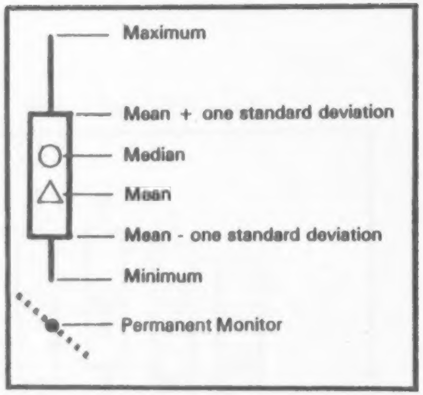
▮ Black Denotes Values Greater than 9 PPM CO

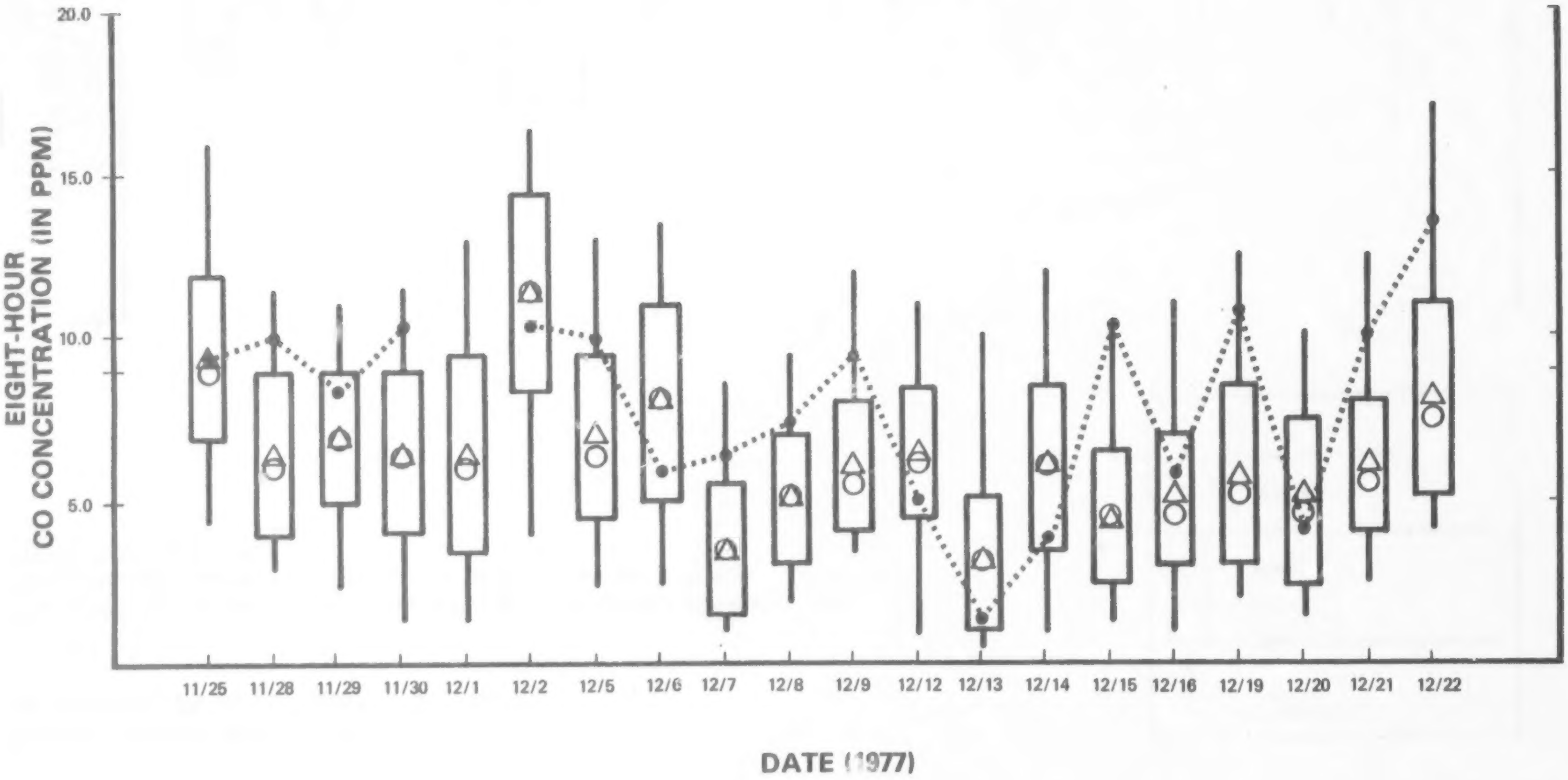
[1] 2 PM TO 6 PM

Boise Carbon Monoxide
November 25 to December 22, 1977

FIGURE 12

Characteristics by Day of the Composite Range of Carbon Monoxide Concentrations for all Sites During an Eight-Hour Period. (10 A.M. to 6 P.M.)

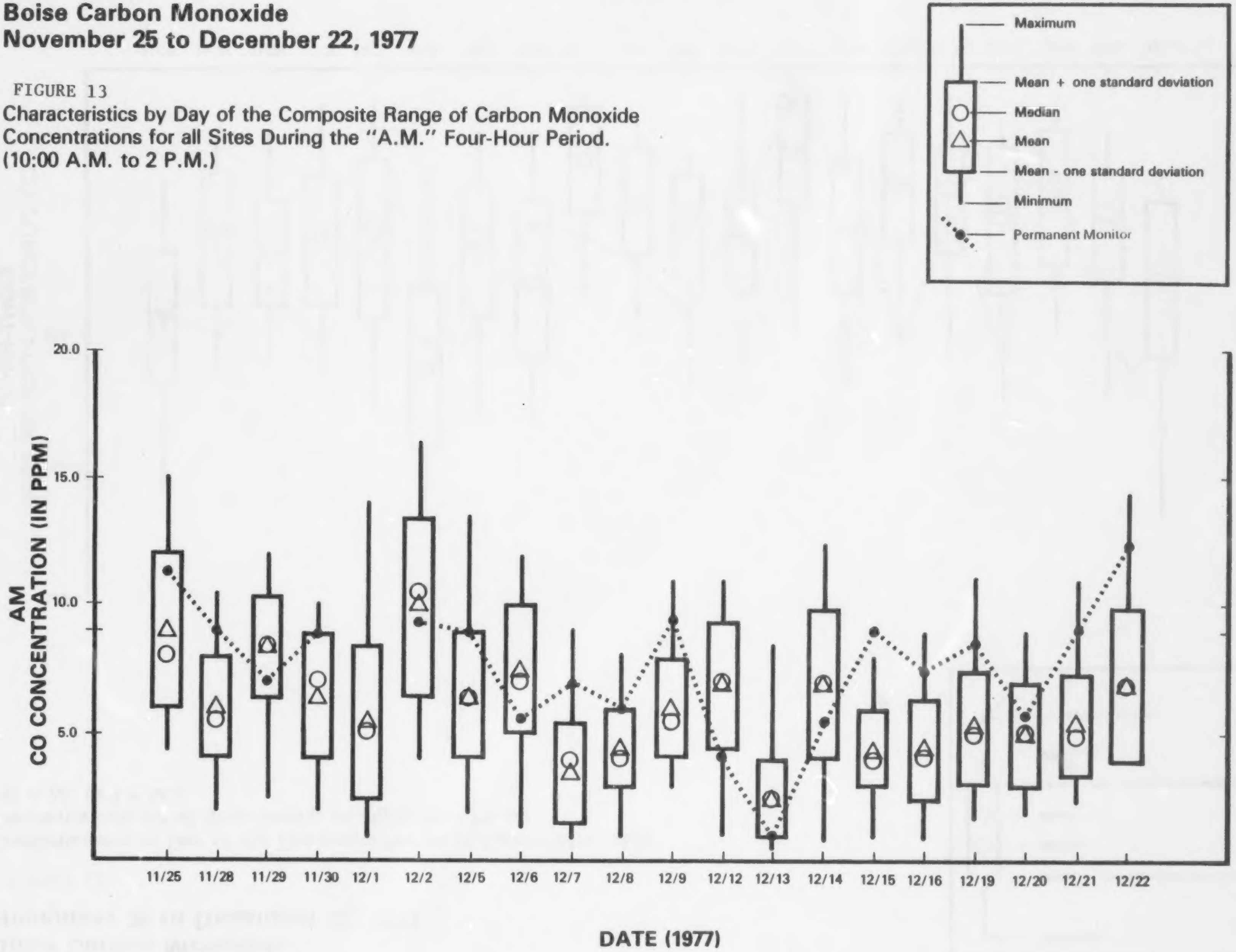

Maximum
Mean + one standard deviation
Median
Mean
Mean - one standard deviation
Minimum
Permanent Monitor



Boise Carbon Monoxide
November 25 to December 22, 1977

FIGURE 13

Characteristics by Day of the Composite Range of Carbon Monoxide Concentrations for all Sites During the "A.M." Four-Hour Period. (10:00 A.M. to 2 P.M.)



Boise Carbon Monoxide
November 25 to December 22, 1977

FIGURE 14

Characteristics by Day of the Composite Range of Carbon Monoxide Concentrations for all Sites During the "P.M." Four-Hour Period. (2 P.M. to 6 P.M.)

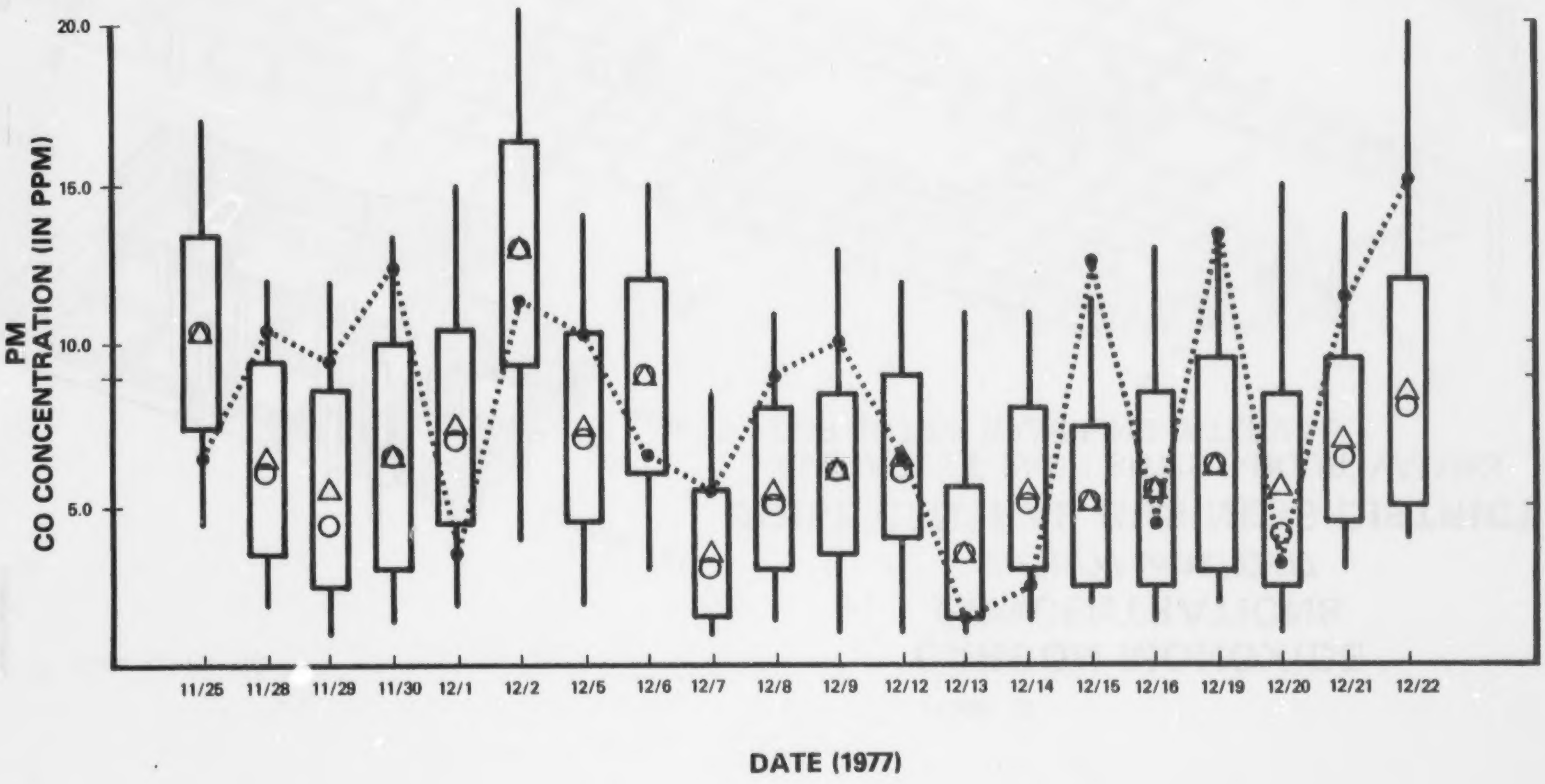


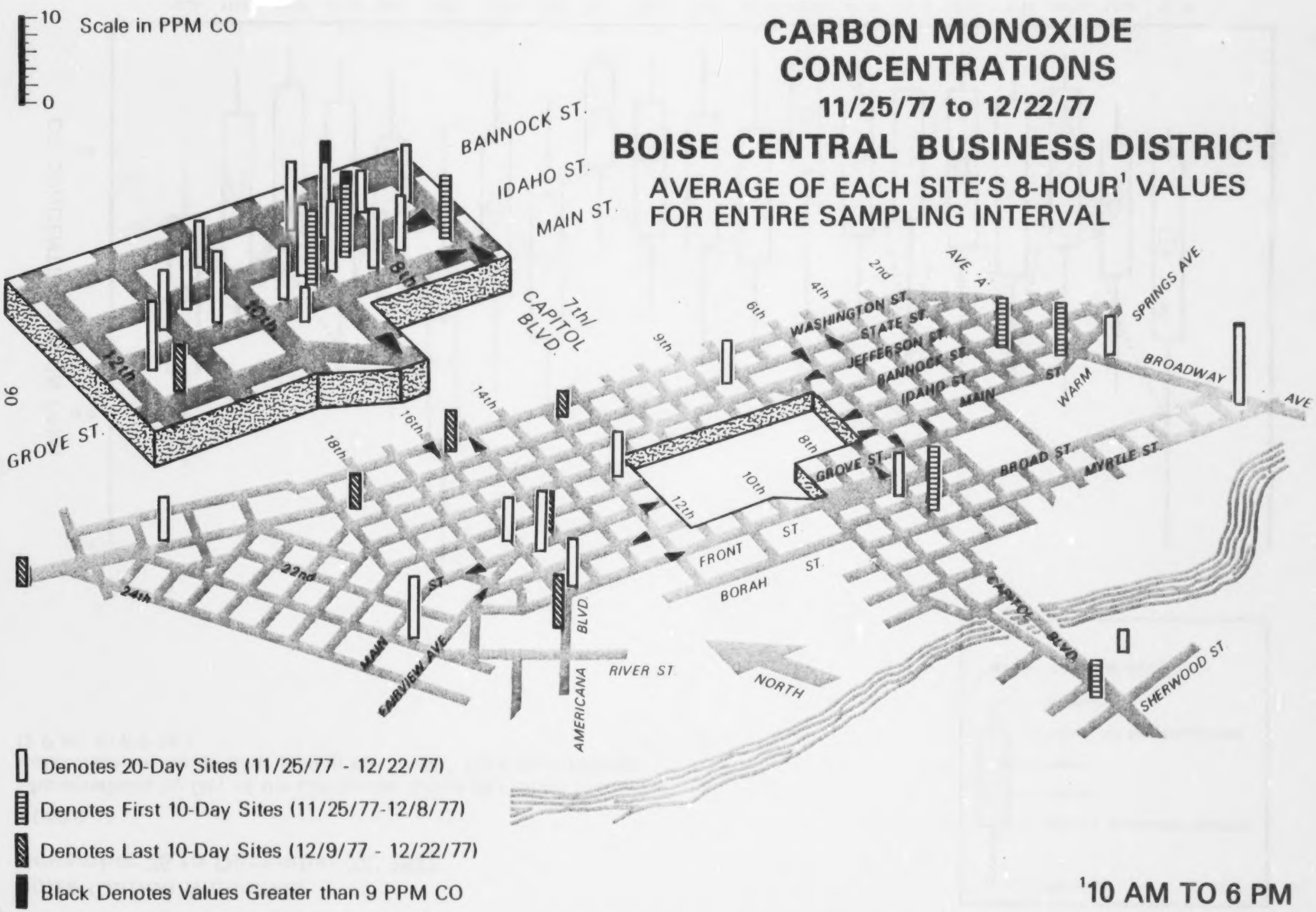
FIGURE 15

CARBON MONOXIDE CONCENTRATIONS

11/25/77 to 12/22/77

BOISE CENTRAL BUSINESS DISTRICT

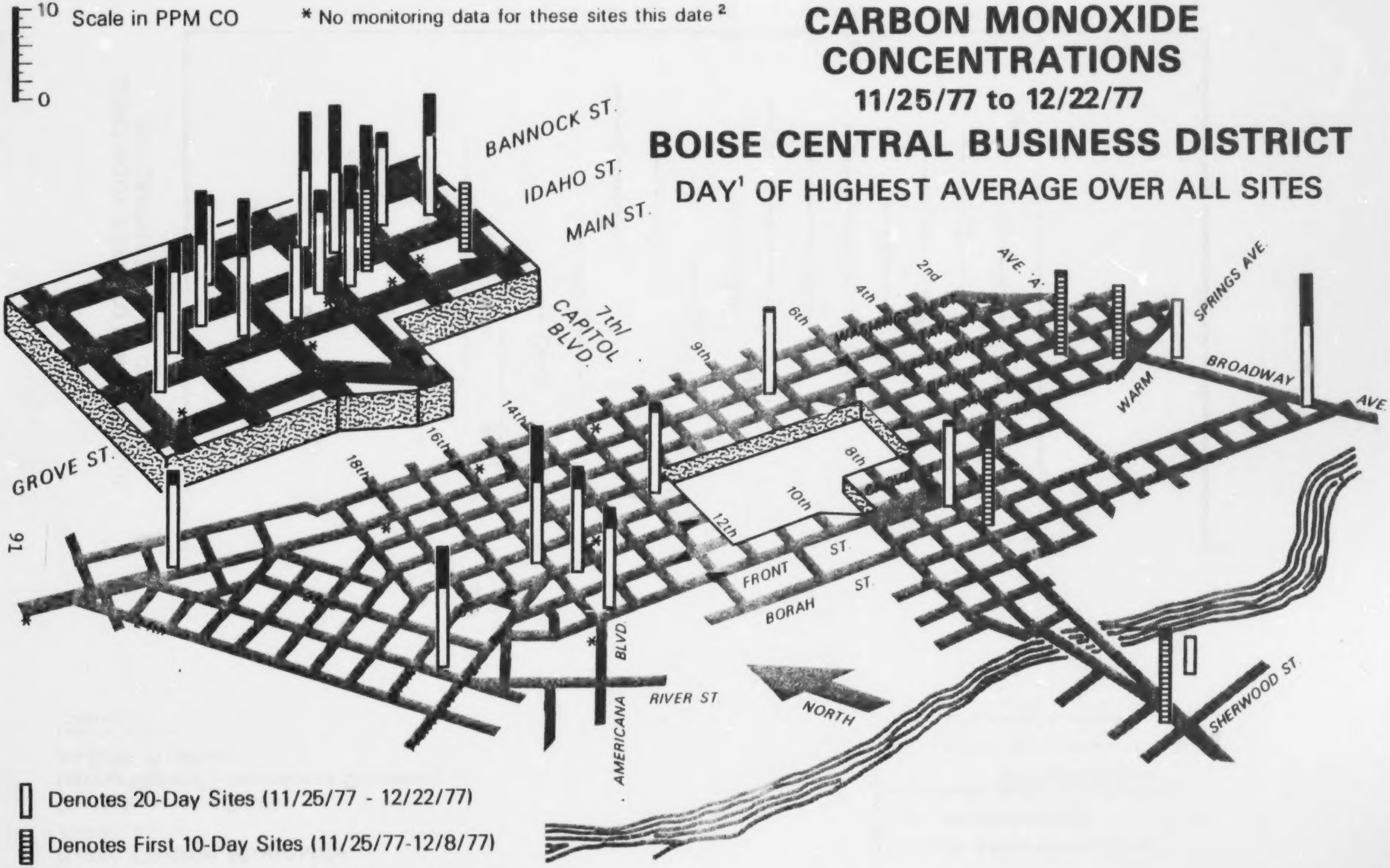
AVERAGE OF EACH SITE'S 8-HOUR[1] VALUES FOR ENTIRE SAMPLING INTERVAL


10
0
Scale in PPM CO
BANNOCK ST.
IDAHO ST.
MAIN ST.
GROVE ST.
12th
10th
8th
7th/ CAPITOL BLVD.
2nd
4th
6th
9th
14th
16th
18th
22nd
24th
AVE. 'A'
SPRINGS AVE
WASHINGTON ST.
STATE ST.
JEFFERSON ST.
BANNOCK ST.
IDAHO ST.
MAIN
WARM
ST.
BROADWAY
AVE
BROAD ST.
MYRTLE ST.
GROVE ST.
FRONT ST
BORAH ST.
CAPITOL BLVD.
SHERWOOD ST
NORTH
RIVER ST
AMERICANA BLVD
MAIN ST
FAIRVIEW AVE
▯ Denotes 20-Day Sites (11/25/77 - 12/22/77)
▥ Denotes First 10-Day Sites (11/25/77-12/8/77)
▨ Denotes Last 10-Day Sites (12/9/77 - 12/22/77)
■ Black Denotes Values Greater than 9 PPM CO

[1] 10 AM TO 6 PM

FIGURE 16

CARBON MONOXIDE CONCENTRATIONS
11/25/77 to 12/22/77
BOISE CENTRAL BUSINESS DISTRICT
DAY[1] OF HIGHEST AVERAGE OVER ALL SITES


10
0
Scale in PPM CO
* No monitoring data for these sites this date[2]
BANNOCK ST.
IDAHO ST.
MAIN ST.
7th/ CAPITOL BLVD.
GROVE ST.
18th
16th
14th
12th
10th
9th
8th
6th
4th
2nd
AVE. 'A'
SPRINGS AVE.
BROADWAY AVE.
WARM
FRONT ST.
BORAH ST.
AMERICANA BLVD.
RIVER ST
NORTH
SHERWOOD ST.

▯ Denotes 20-Day Sites (11/25/77 - 12/22/77)

▥ Denotes First 10-Day Sites (11/25/77-12/8/77)

▨ Denotes Last 10-Day Sites (12/9/77 - 12/22/77)

■ Black Denotes Values Greater than 9 PPM CO

[1] 10 AM TO 6 PM

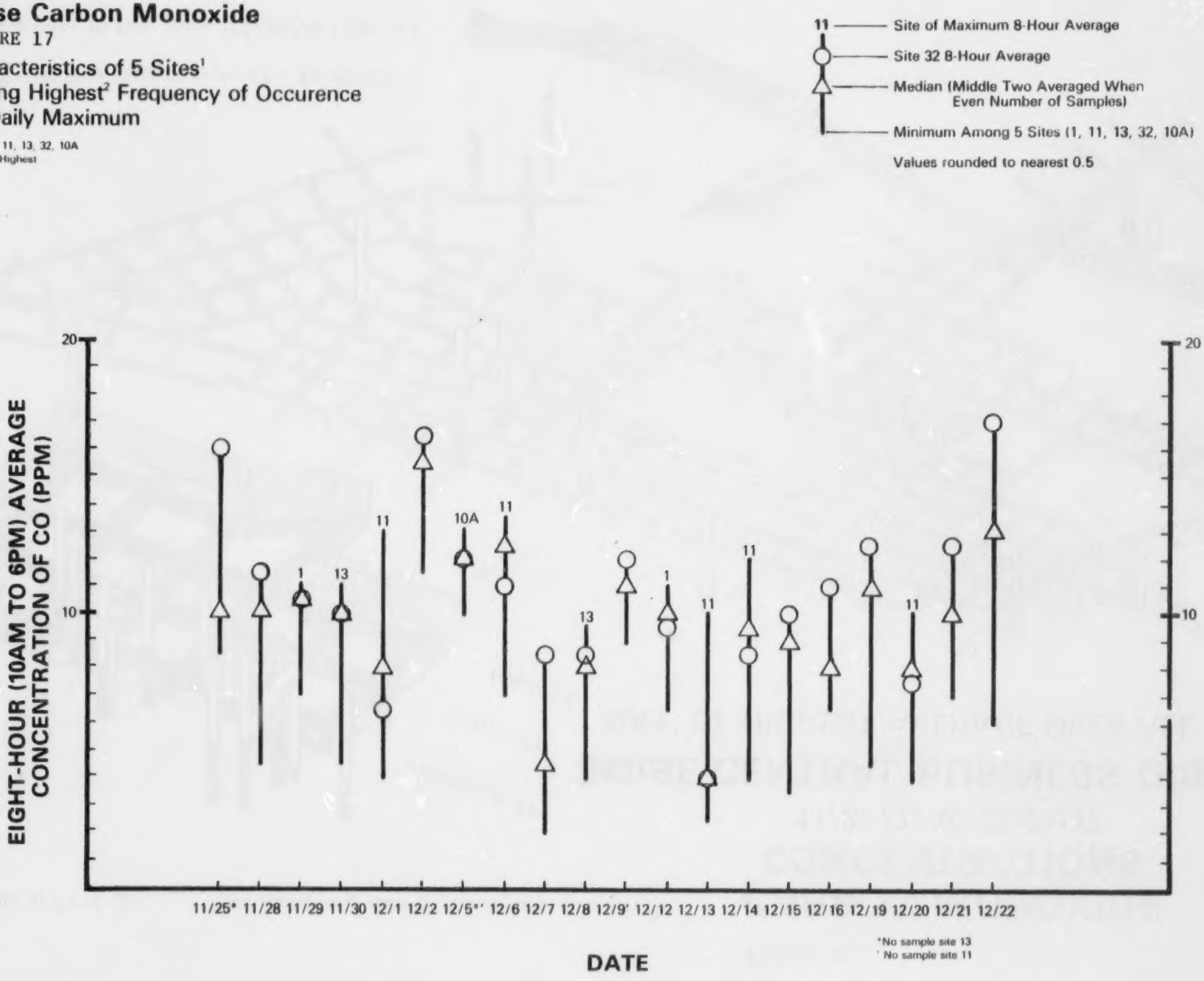
[2] 12/2/77

Boise Carbon Monoxide

FIGURE 17

Characteristics of 5 Sites[1]
Having Highest[2] Frequency of Occurence
As Daily Maximum

[1] Sites 1, 11, 13, 32, 10A
[2] Site 32 Highest

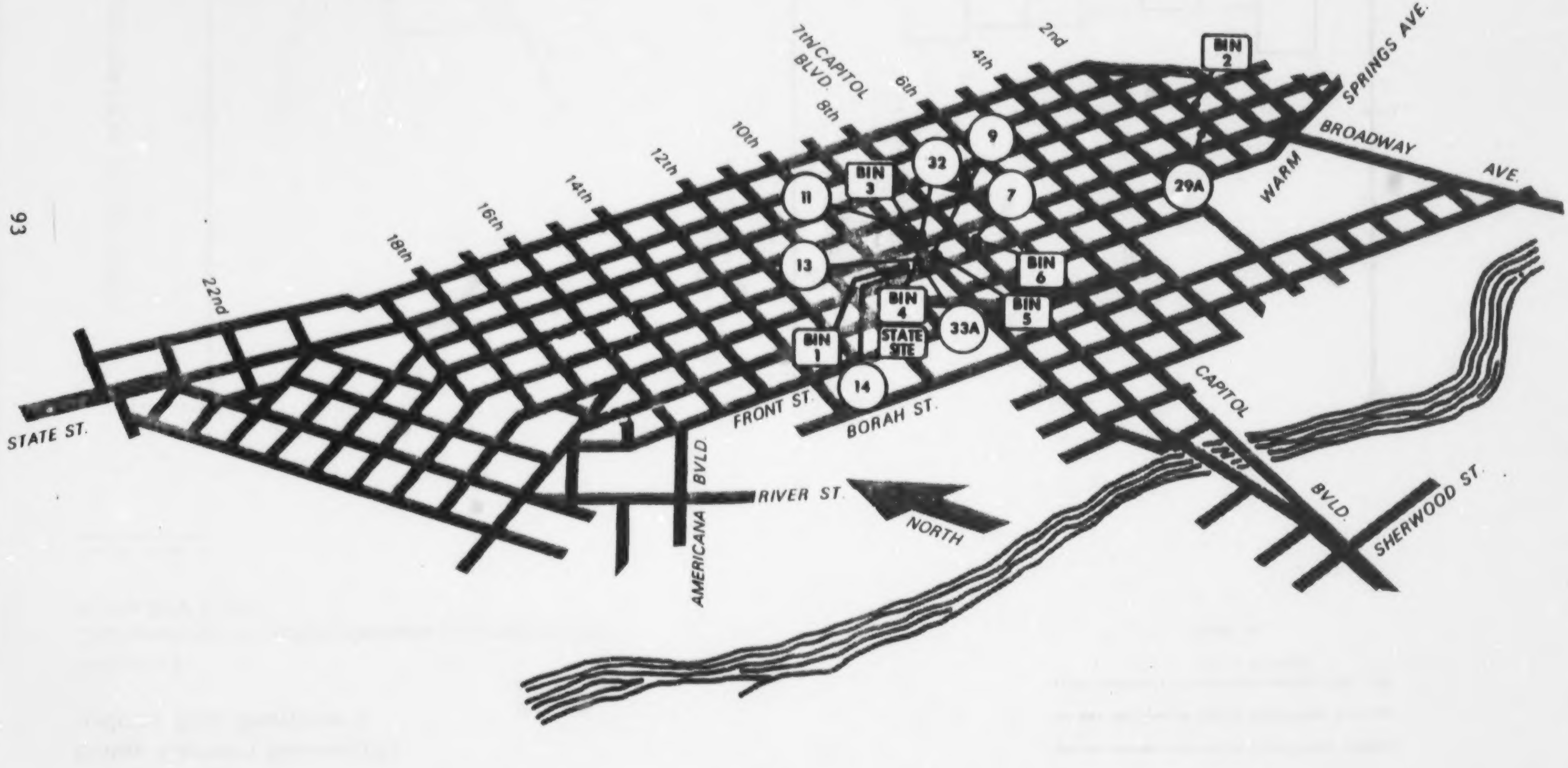


*No sample site 13
' No sample site 11

FIGURE 18

Boise Carbon Monoxide Study
INDOOR SITE LOCATIONS
11/25/77 to 12/22/77

INDOOR SITE	ADDRESS	BUSINESS
BIN 1	MAIN & 10th	HOTEL
BIN 2	130 E. BANNOCK	HOSPITAL
BIN 3	IDAHO & 9th	RETAIL JEWELER
BIN 4	109 N. 9th	RETAIL FABRICS
BIN 5	114 N. 9th	RETAIL SEWING
BIN 6	100 N. 8th	DEPT. STORE

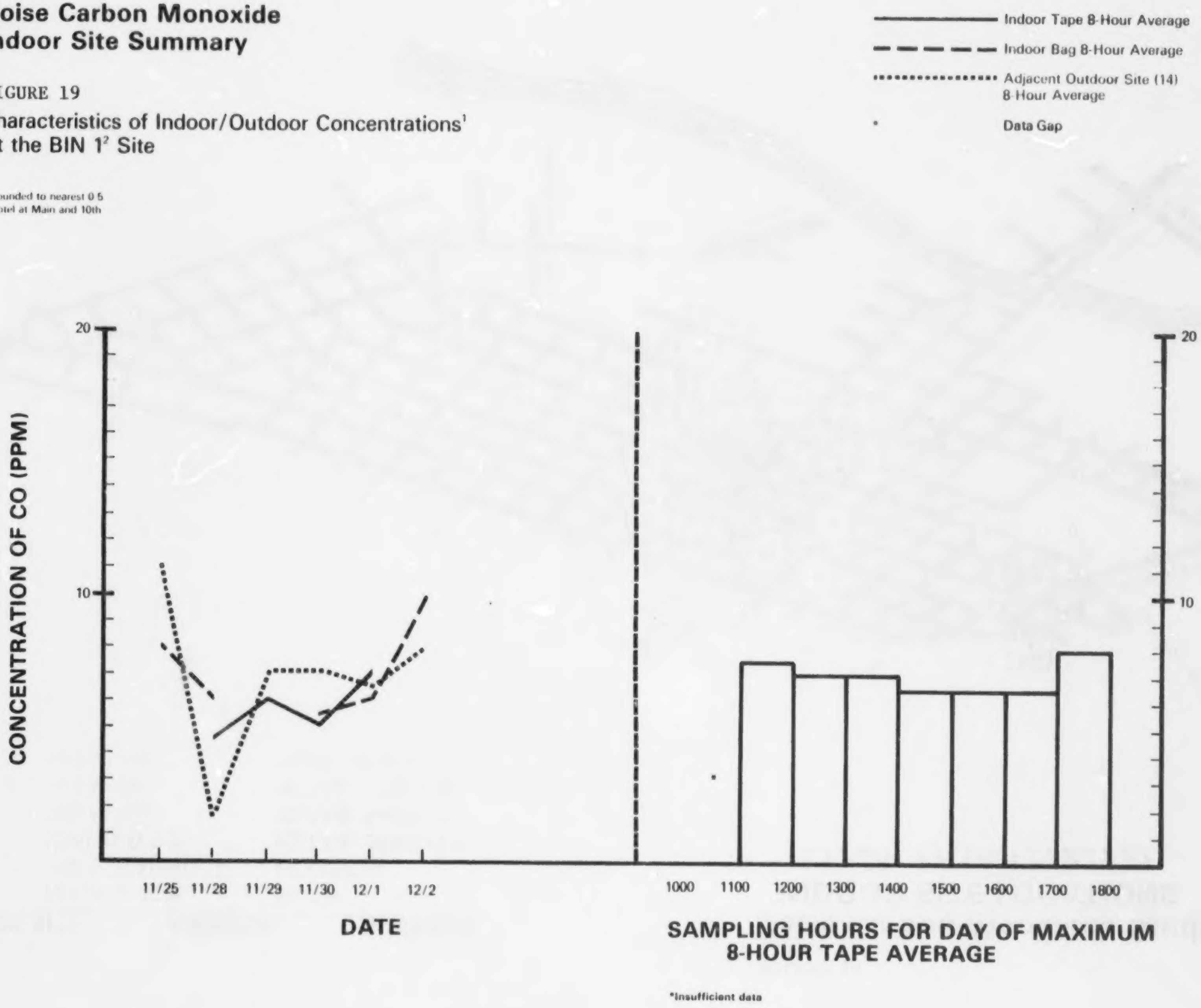

2nd
4th
6th
7th/CAPITOL BLVD.
8th
10th
12th
14th
16th
18th
22nd
STATE ST.
FRONT ST.
BORAH ST.
AMERICANA BVLD.
RIVER ST.
NORTH
CAPITOL BVLD.
SHERWOOD ST.
WARM SPRINGS AVE.
BROADWAY AVE.
BIN 1
BIN 2
BIN 3
BIN 4
BIN 5
BIN 6
STATE SITE
9
32
7
29A
11
13
33A
14

Boise Carbon Monoxide
Indoor Site Summary

FIGURE 19

Characteristics of Indoor/Outdoor Concentrations[1] At the BIN 1[2] Site

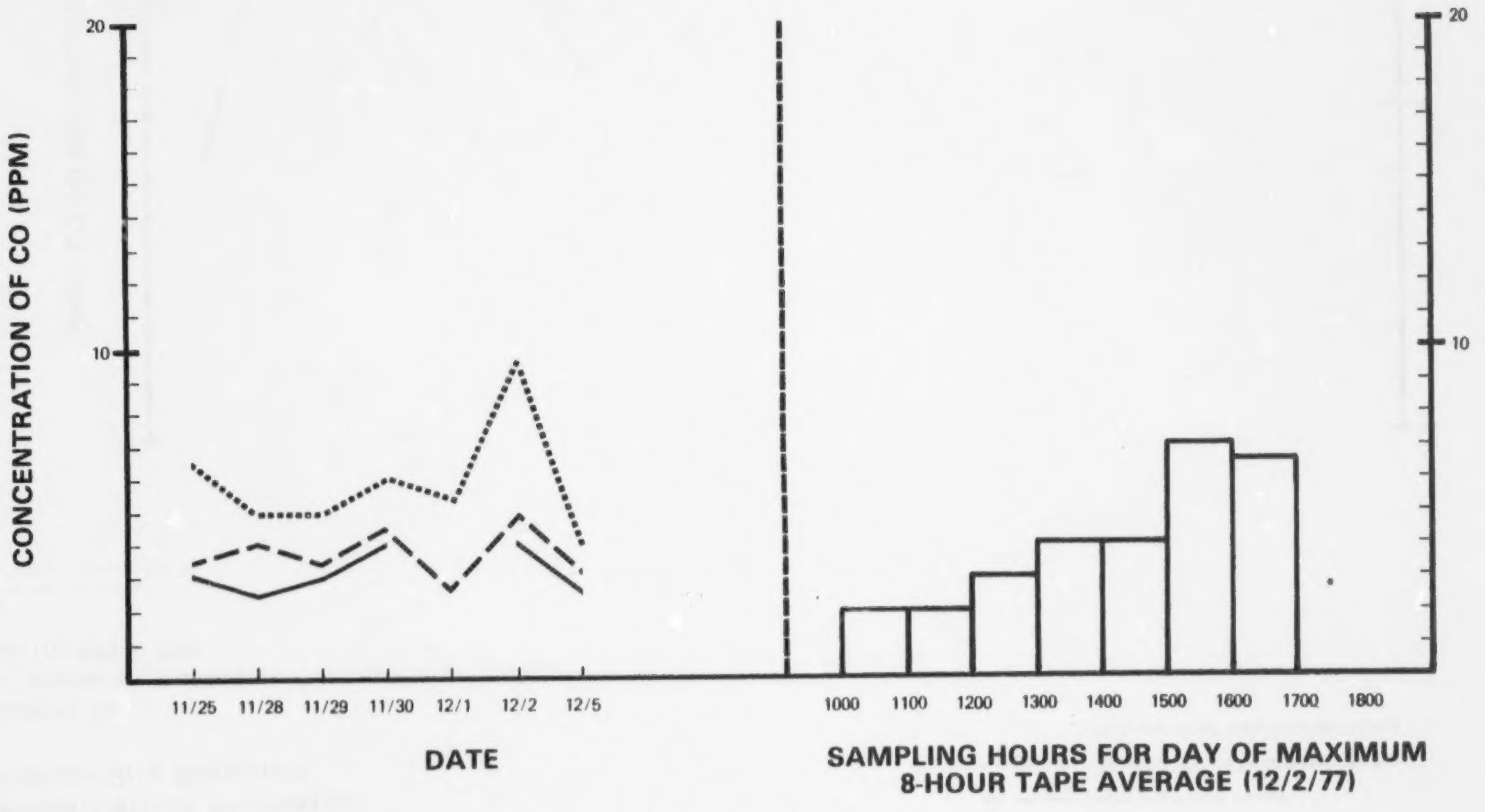
[1] Rounded to nearest 0.5
[2] Hotel at Main and 10th



*Insufficient data

Boise Carbon Monoxide Indoor Site Summary

FIGURE 20
Characteristics of Indoor/Outdoor Concentrations[1]
At the BIN 2[2] Site



*Insufficient data

---

[1] Rounded to nearest 0.5

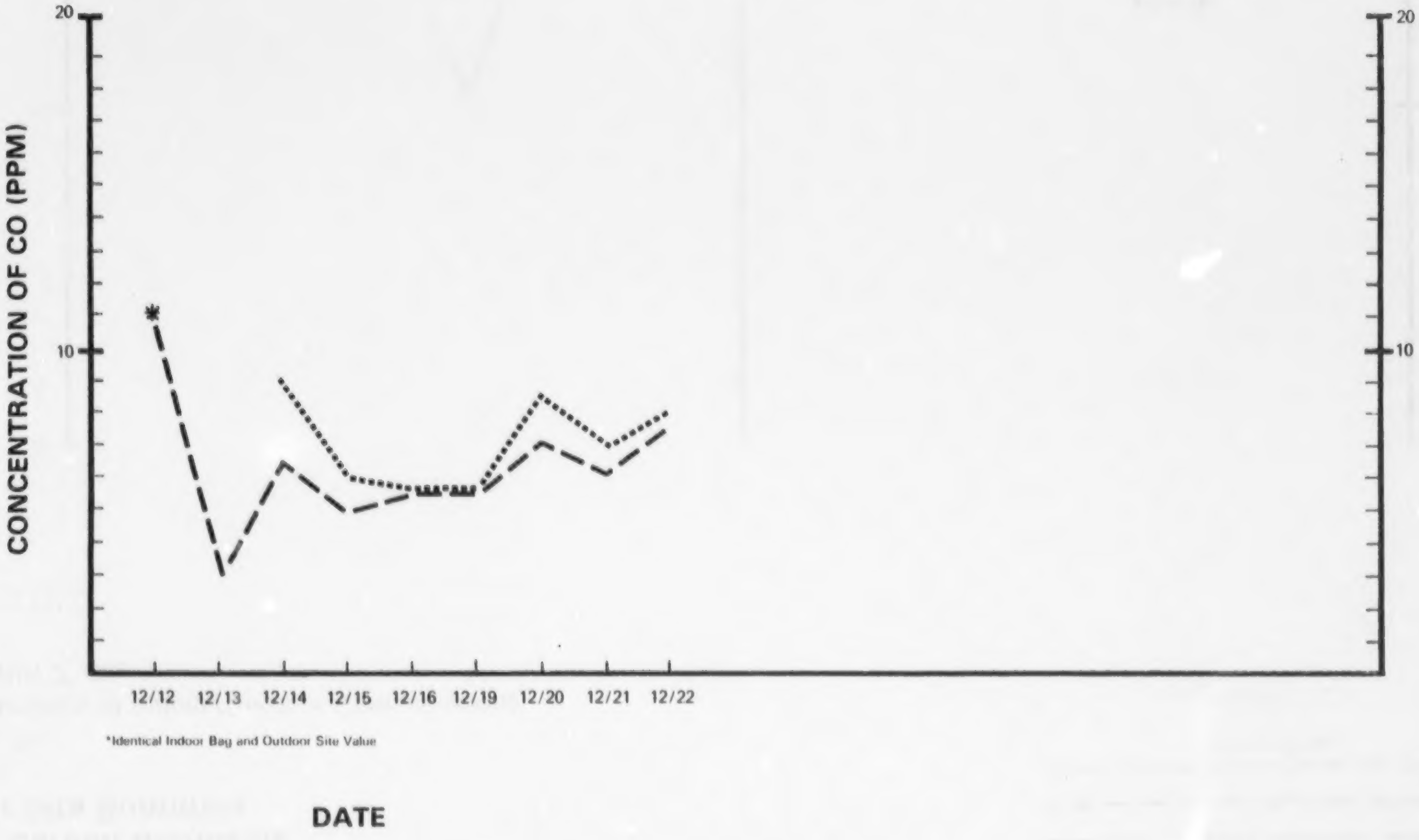
[2] Hospital at 130 E. Bannock

Boise Carbon Monoxide
Indoor Site Summary

FIGURE 21
Characteristics of Indoor/Outdoor Concentrations[1]
At the BIN 5[2] Site

1 Rounded to nearest 0.5
2 Retail sewing store at 114 N. 9th

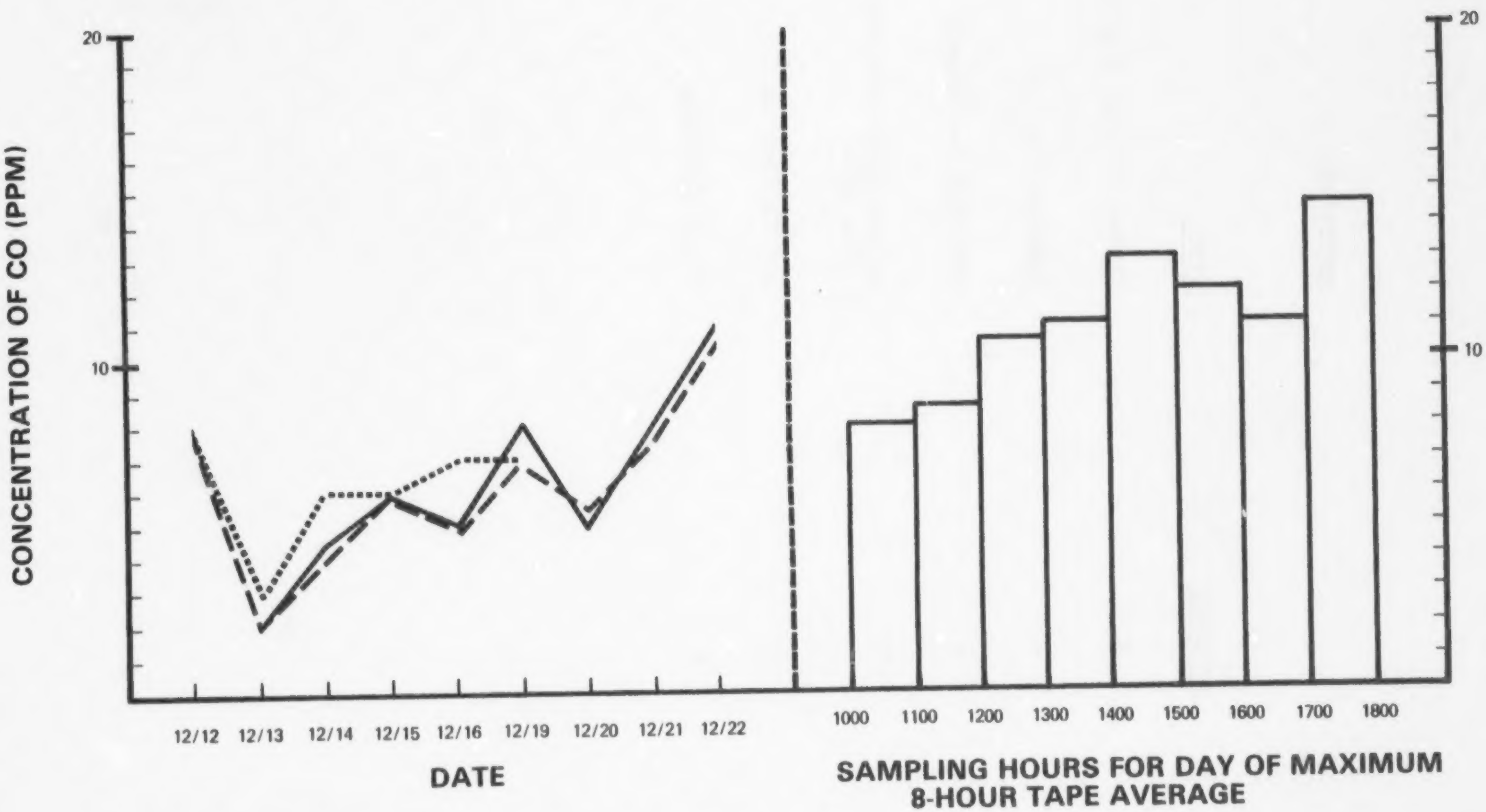
— — — Indoor Bag 8-Hour Average
·········· Adjacent Outdoor Site (9) 8-Hour Average
Insufficient Indoor Tape Data for Plotting



*Identical Indoor Bag and Outdoor Site Value

Boise Carbon Monoxide Indoor Site Summary

FIGURE 22
Characteristics of Indoor/Outdoor Concentrations[1]
At the BIN 6[2] Site



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[1] Rounded to nearest 0.5
[2] Department store at 100 N. 8th

APPENDICES

APPENDIX	TITLE
A	Carbon Monoxide Sampling Sites
B	Sampling Stations
C	Equipment Performance
D	Outdoor Study Site and Permanent Monitor Site Data
E	Traffic Flow Map
F	Indoor Site Data

APPENDIX A

CARBON MONOXIDE SAMPLING SITES

Site Identification
Boise Carbon Monoxide Study - November 25 through December 22, 1977

Site No.	Main St.	Cross St.	Side of St.	Fixture	Comment
1	Broadway	n/o Myrtle	W	utility pole	near Preco, Inc.
2	Broadway	n/o Broad	E	utility pole	
3	Capitol/7th	n/o College	E	light pole	on Boise State University campus
4	Capitol/7th	n/o Broad	W	light pole	near Stein McMurray
5	Capitol/7th	n/o Idaho	W	parking meter 703	
6	8th	n/o Idaho	E	parking meter 683	
7	8th	n/o Main	E	parking meter 406	
8	Main	w/o 8th	N	parking meter 340/341	health food store
9	9th	n/o Main	E	parking meter 432	near Singer's
10A	Idaho	w/o 8th	S	light pole	near Roper's
11	9th	n/o Idaho	E	light pole	near camera shop
12	State	w/o 8th	S	other pole	
13	9th	n/o Main	W	light pole	near Odd Fellows Hall
14	Main	w/o 9th	N	other pole	5 min park
15	Main	w/o 9th	S	light pole	near One Capital Center
16	10th	n/o Idaho	W	616	
17	Idaho	w/o 10th	S	parking meter 480/481	
18	Main	w/o 10th	N	light pole	near Nick's Shoe Store
19	11th	n/o Main	W	light pole	in front of Orient East
20	Main	w/o 11th	S	parking meter 281	in front of Owyhee
21	13th	n/o Idaho	E	light pole	
22	Front	w/o 15th	N	other pole	
23	Main	w/o 15th	S	utility pole	near CIT
24	16th	n/o Main	W	utility pole	

25	23rd	n/o Fairview	E	other pole	near Kalbus
26	State	w/o 22nd	N	light pole	
27A	Capitol	n/o College	W	hotel sign pole	near Boulevard Motel
27B	13th	n/o State	E	speed limit pole	near Boise High School sports field
28A	Main	w/o Broadway	N	other pole	
28B	16th	n/o State	E	other pole	no park, bike lane sign
29A	1st	n/o Idaho	W	light pole	
29B	State	w/o 18th	S	fence post	at Pepe's
30A	Capitol	n/o Myrtle	E	parking meter 442	
30B	State	w/o 25th	S	light pole	directly across from 25th
31A	Capitol/7th	n/o Main	W	parking meter 387	
31B	15th	n/o Main	W	light pole	behind Buttrey's
32	Idaho	w/o 8th	N	parking meter 662	
32B	16th	n/o River Rd	W		
33A	9th	n/o Main	W	parking meter 442	
33B	Grove	w/o 11th	N	parking meter 96	behind Owyhee

PERMANENT MONITOR (State Site)

ODD	9th	n/o Main	W	Odd Fellows Hall	near Site No. 13

APPENDIX B

SAMPLING STATIONS

SAMPLING STATIONS

Each sampling station used in the survey contained a removable sample pump and a bag assembly. These were attached to a mounting arm to extend the intake of the pump about one meter from a light pole, utility pole, or parking meter which provided the basic support. These stations are described as follows:

Sampling Station Parts

The sampler consists of three major parts:

1. The sample pump and bag assembly.
2. The bracket assembly which extends the pump and bag assembly meter from the mounting unit over the sidewalk.
3. The mounting unit which attaches to a light pole or utility pole or, with adaptations, to a parking meter. This unit holds the entire sample pump/bag assembly and mounting arm at three meters above ground level.

General

The major components are made of PVC plastic pipe that is readily available from any plumbing supply house. The bag, which the gas samples are collected in, is made of aluminized mylar, Tedlar or other suitable plastics compatible with the gas to be collected. The capacity of the bags is slightly more than four liters. The pump is an EMI, portable pulse pump, battery operated and adjusted to collect a gas sample at one/liter hour. The theory of bag sampling requires pumping the sample of air into the bag at a constant rate without filling the bag. Based on this theory, flow adjustments are quite simple and require no flow meters, only visual inspection to determine the quantity of air in the bag.

Sample Pump and Bag Assembly

The support assembly consists of two 4-inch diameter sewage and drain caps (Part Nos. 15 and 16) that are held together on the edge by two 1/8-inch x 1/4-inch pop rivets. The pump is held in one cap by a 2-inch, 10-32 screw which fits in the top of the EMI sample pump. To protect the pump, a shield made of 4-inch diameter sewer and drain (S&D) pipe (Part No. 17) is slipped into the 4-inch cap (Part No. 16). The shield can be removed for access to the pump. The other 4-inch cap fits on top of the bag tube and thereby, secures the pump to the bag assembly.

The rectangular bag (Part No. 25) is designed to fit into the 4-inch diameter bag cylinder (Part No. 20) and is held in place by a Robert's valve. One-inch high, four-inch long strips of 10-mil, clear, rigid plastic (available at air supply stores) are placed across the width of the bag at four equally spaced places with an additional one at the top and bottom for a total of six strips. The strips, secured with double back tape, are placed on the valve side of the bag and aid uniform collapsing of the bag by maintaining the bag flat against the side of the cylinder. To provide for mounting the assembly to the bracket, a 1-1/4" diameter sewer and drain pipe (Part No. 22) is riveted to the side (Part No. 20) with two 1/8" x 1/4" pop rivets and washers. If these are not aligned vertically, the bag assembly will "list" from the vertical when mounted on the bracket.

A bottom cap (Part No. 21) with a 3/8" hole in the center for draining moisture protects the bag from weather and vandalism. An eye bolt (Part No. 23), secured in the upper three inches of the tube, is used when moving the bag/pump unit at heights. A hook at the end of a long, hand-held pole is inserted in the eye bolt to lift and lower the sample pump/bag assembly when it is mounted above a person's reach.

Bracket Assembly

The bracket assembly consists of a triangle structure to extend the sampler at least one meter from the curb over the side walk. The triangle is constructed of white, PVC Schedule 40 pipe and fittings as shown in Parts 1 through 14. Bonding with PVC cement is required for the following pieces: 5, 6, 7, 9, and 10; 11, 12, and 13; 1 and 14; 2, 3, and 4. No other joints require cementing. This allows disassembling into four pieces for ease in storage and transport.

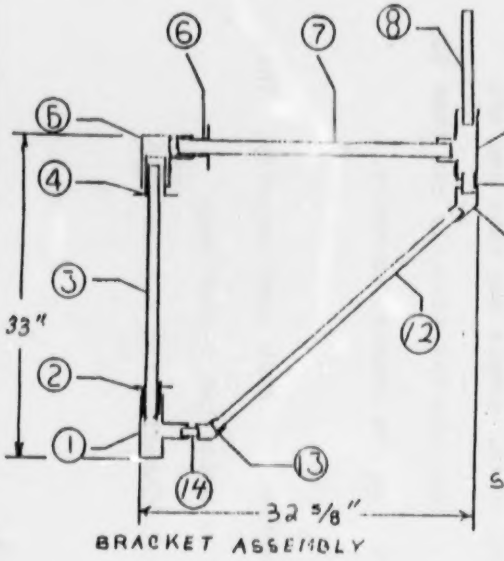
Parts 2, 3 and 4 (cemented together) are required for pole mounting where the bracket must fit over a one-inch diameter pipe. Part 24 is substituted for these when the bracket assembly is mounted on a one-inch diameter pole attached to a parking meter. Part No. 24 is slipped over the one-inch diameter pipe attached to the parking meter. The bag assembly is attached to the bracket assembly by Part No. 22 slipping over Part No. 8.

Mounting

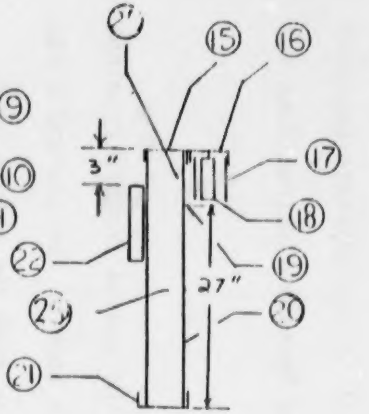
For mounting on a light pole or any six-inch through twenty-four inch diameter pole, two Radio Shack "Chimmney TV antenna mounts" with adjustable straps are required and attached to Part No. 3. For mounting on a parking meter, two 5 feet long, steel TV antenna poles (Part No. 28) are required along with two 4-inch gutter mounts. Both are available from Radio Shack. Rebending the gutter mounts may be necessary if the parking meter's vertical pipe is less than four inches in diameter. Part 24 of the triangle assembly slips over the 1" pipe. Steel pipe should be used because aluminum does not have the desired strength.

To remove the sample pump and bag assembly (with the sample inside) from the bracket assembly, an eight-foot wooden pole with a hook at the top and a six inch diameter, plastic collar at twenty-four inches from the top is used. The collar is slipped around the lower end of the sample bag tube and the hook is engaged to the eye (Part No. 23). The pump/bag assembly can then be lifted up over Part No. 8, disengaging it from the bracket assembly.

Two or more bag assemblies are usually desired for each pump assembly. This permits nearly continuous 8-hour samples by using two 4-hour bags sequentially with the same pump assembly. (Changing the bag assembly requires less than a minute.)



BRACKET ASSEMBLY



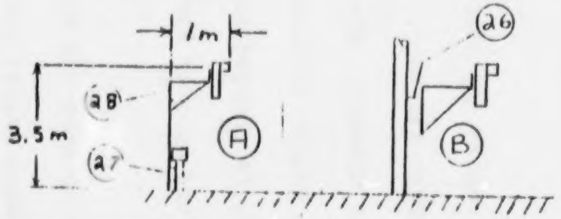
SAMPLE PUMP & BAG ASSEMBLY

NOTE: FOR PARKING METER INSTALLATION Ⓐ USE 2-5' TV ANTENNA POLE WITH 2-GUTTER CLAMPS, 27, AND SUBSTITUTE PART 24 FOR PARTS 2, 3, 4

FOR POLE MOUNT USE 2-TV ANTENNA Ⓑ CHIMNEY MOUNTS 26

MOUNTS AVAILABLE THRU RADIO SHACK

PARTS 15 & 16 and 20 & 22 HELD WITH 1/4" POP RIVET



Material - PVC Sch-40 White Plastic Pipe & Fittings

List of Parts

1 1¼" Tee
2 1" to 1¼" Bushing
3 1" Pipe 26¾" long
4 1" to 1¼" Bushing
5 1¼" Elbow
6 1" to 1¼" Bushing
7 1" Pipe 29½" long
8 1" Pipe 14" long
9 1" Tee
10 1" Pipe 1½" long
11 1" 45°
12 1" Pipe 37¾" long
13 1" 45°
14 1" Pipe 1½" long
15 4" Pipe Cap S&D
16 4" Pipe Cap S&D
17 4" Pipe 5" long S&D
18 EMI Pulse Pump
1 liter per hour
19 Hinkley-Roberts metal 3/8" Valve
20 4" Pipe 33" long S&D
21 4" Pipe Cap S&D
22 1¼" Pipe 9" long S&D
23 3" long eye Bolt
24 1¼" Pipe 27½" long S&D (Pole Mount)
25 Aluminized Mylar Sample Bag 32" long & 6½" Wide

26 Pole Mount
Radio Shack
#15-527

27 Meter Mount
Radio Shack
#15-873

28. Pole (2-5')
Radio Shack
#15-842

S&D = Sewer & Drain

EPA 4-Liter Bag Sampler		Alsid, Snowden & Assoc 13240 Northrup Bellevue Wa. 206-641-5130
Designed By HA	Drawn By EA	

APPENDIX C

EQUIPMENT PERFORMANCE

APPENDIX C

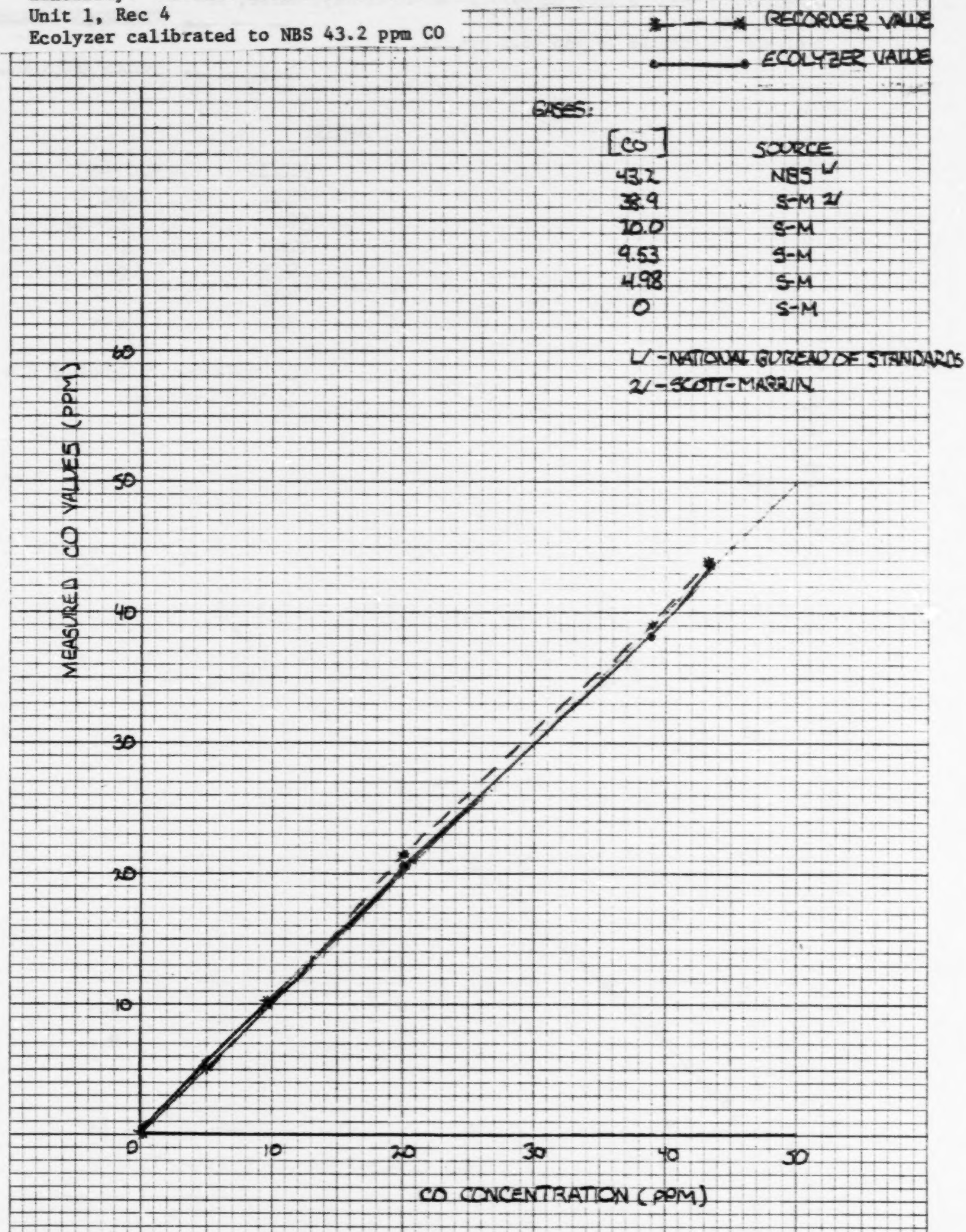
EQUIPMENT PERFORMANCE

Figure | | Page
C-1 Linearity Check - Unit 1 .... C-1

C-2 Linearity Check - Unit 2 .... C-2

FIGURE C-1

Linearity: Results from 12/10/77, Lab at Armory, Boise, ID
Unit 1, Rec 4
Ecolyzer calibrated to NBS 43.2 ppm CO



GASES:

[CO]	SOURCE
43.2	NBS 1/
38.9	S-M 2/
20.0	S-M
9.53	S-M
4.98	S-M
0	S-M

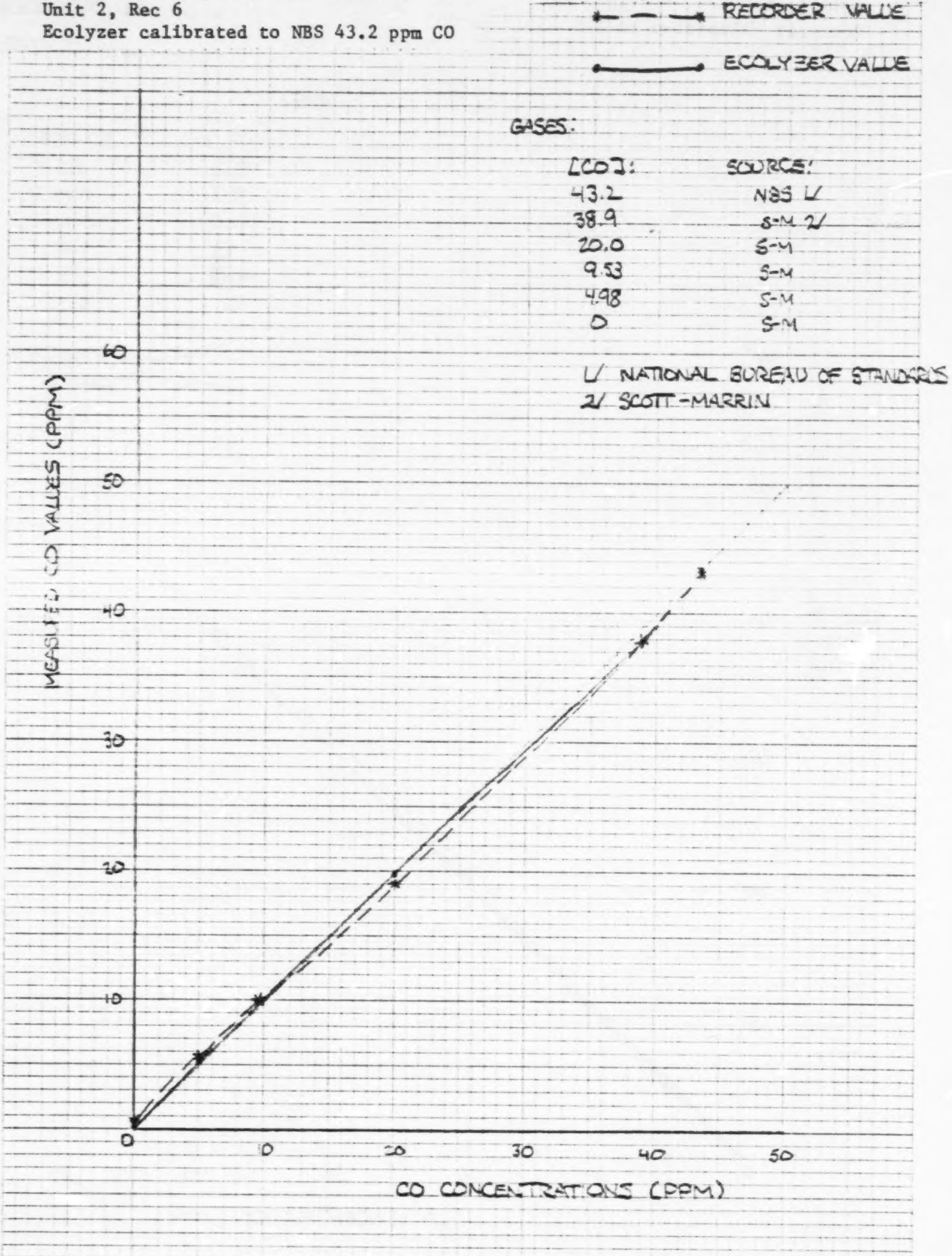
1/ - NATIONAL BUREAU OF STANDARDS
2/ - SCOTT-MARRIN

THE MEAD CORPORATION, DAYTON, O. 45402

ACCURACY® CROSS SECTION No. 58-1910

FIGURE C-2

Linearity: Results from 12/09/77, Lab at Armory, Boise, ID
Unit 2, Rec 6
Ecolyzer calibrated to NBS 43.2 ppm CO



GASES:

[CO]:	SOURCE:
43.2	NBS 1/
38.9	S-M 2/
20.0	S-M
9.53	S-M
4.98	S-M
0	S-M

1/ NATIONAL BUREAU OF STANDARDS
2/ SCOTT-MARRIN

APPENDIX D

OUTDOOR STUDY SITE AND PERMANENT MONITORING SITE DATA

APPENDIX D

DATA TABLES

Table — Page

D-1 Four-Hour AM, PM, and Eight-Hour Averages and Ratios of AM and PM Averages - EPA Study Sites.................. D-1

D-2 Ratios of Eight-Hour Averages (EPA Study Sites and the Permanent Monitor) Sorted by EPA Study Site............. D-12

D-3 Ratios of Eight-Hour Averages (EPA Study Sites and the Permanent Monitor) Sorted by the Average for the Permanent Monitor...................................... D-18

D-4 Ratios Greater Than 1.5 for an Eight-Hour Average Greater Than 9.0 ppm at the Study Site.................. D-24

D-5 a,b,c Mean Ratios of Eight-Hour Averages (EPA Study Sites and the Permanent Monitor)................................. D-25

D-6 Mean of All Ratios of Eight-Hour Averages Each Day....... D-27

D-7 Data from the Permanent Monitor at 115 1/2 Ninth Street.. D-28

TABLE D-1. Four-Hour AM, PM and Eight-Hour Averages and Ratios of AM and PM Averages - EPA Study Sites

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
1	11/25/77	1	7.9	9.2	8.6	BROADWAY	N/O MYRTLE	W	.86
2	11/28/77	1	9.2	10.9	10.1	BROADWAY	N/O MYRTLE	W	.84
3	11/29/77	1	11.0	11.0	11.0	BROADWAY	N/O MYRTLE	W	1.00
4	11/30/77	1	7.9	11.8	9.9	BROADWAY	N/O MYRTLE	W	.67
5	12/01/77	1	8.1	15.1	11.6	BROADWAY	N/O MYRTLE	W	.54
6	12/02/77	1	12.9	16.5	14.7	BROADWAY	N/O MYRTLE	W	.78
7	12/05/77	1	8.3	12.0	10.2	BROADWAY	N/O MYRTLE	W	.69
8	12/06/77	1	9.9	14.9	12.4	BROADWAY	N/O MYRTLE	W	.66
9	12/07/77	1	4.2	4.9	4.6	BROADWAY	N/O MYRTLE	W	.86
10	12/08/77	1	5.9	9.1	7.5	BROADWAY	N/O MYRTLE	W	.65
11	12/09/77	1	10.0	8.0	9.0	BROADWAY	N/O MYRTLE	W	1.25
12	12/12/77	1	9.9	12.2	11.1	BROADWAY	N/O MYRTLE	W	.81
13	12/13/77	1	3.8	4.4	4.1	BROADWAY	N/O MYRTLE	W	.86
14	12/14/77	1	10.5	10.3	10.4	BROADWAY	N/O MYRTLE	W	1.02
15	12/15/77	1	6.1	10.3	8.2	BROADWAY	N/O MYRTLE	W	.59
16	12/16/77	1	8.1	8.3	8.2	BROADWAY	N/O MYRTLE	W	.98
17	12/19/77	1	7.0	12.2	9.6	BROADWAY	N/O MYRTLE	W	.57
18	12/20/77	1	8.0	9.5	8.8	BROADWAY	N/O MYRTLE	W	.84
19	12/21/77	1	8.3	12.5	10.4	BROADWAY	N/O MYRTLE	W	.66
20	12/22/77	1	10.2	15.0	12.6	BROADWAY	N/O MYRTLE	W	.68
21	11/25/77	2	10.9	7.0	9.0	BROADWAY	N/O BROAD	E	1.56
22	11/28/77	2	4.0	4.0	4.0	BROADWAY	N/O BROAD	E	1.00
23	11/29/77	2	5.1	3.9	4.5	BROADWAY	N/O BROAD	E	1.31
24	11/30/77	2	6.8	5.2	6.0	BROADWAY	N/O BROAD	E	1.31
25	12/01/77	2	1.0	2.1	1.5	BROADWAY	N/O BROAD	E	.48
26	12/02/77	2	4.3	8.9	6.6	BROADWAY	N/O BROAD	E	.48
27	12/05/77	2	3.9	7.0	5.5	BROADWAY	N/O BROAD	E	.56
28	12/06/77	2	2.0	3.2	2.6	BROADWAY	N/O BROAD	E	.63
29	12/07/77	2	4.2	4.3	4.3	BROADWAY	N/O BROAD	E	.98
30	12/08/77	2	.0	3.2	.0	BROADWAY	N/O BROAD	E	.00
31	12/09/77	2	.0	7.0	.0	BROADWAY	N/O BROAD	E	.00
32	12/12/77	2	3.4	3.7	3.6	BROADWAY	N/O BROAD	E	.92
33	12/13/77	2	.5	2.0	1.2	BROADWAY	N/O BROAD	E	.25
34	12/14/77	2	.0	2.2	.0	BROADWAY	N/O BROAD	E	.00
35	12/15/77	2	3.5	4.6	4.1	BROADWAY	N/O BROAD	E	.76
36	12/16/77	2	4.9	2.0	3.5	BROADWAY	N/O BROAD	E	2.45
37	12/19/77	2	3.9	6.3	5.1	BROADWAY	N/O BROAD	E	.62
38	12/20/77	2	3.9	1.6	2.7	BROADWAY	N/O BROAD	E	2.44
39	12/21/77	2	5.3	5.9	5.6	BROADWAY	N/O BROAD	E	.90
40	12/22/77	2	7.0	8.4	7.7	BROADWAY	N/O BROAD	E	.83
41	11/25/77	3	5.0	4.5	4.8	CAPITOL	N/O COLLEGE	E	1.11
42	11/28/77	3	.0	2.3	.0	CAPITOL	N/O COLLEGE	E	.00
43	11/29/77	3	3.9	1.1	2.5	CAPITOL	N/O COLLEGE	E	3.55
44	11/30/77	3	2.1	1.3	1.7	CAPITOL	N/O COLLEGE	E	1.62
45	12/01/77	3	1.2	1.8	1.5	CAPITOL	N/O COLLEGE	E	.67
46	12/02/77	3	4.3	4.1	4.2	CAPITOL	N/O COLLEGE	E	1.05
47	12/05/77	3	2.0	3.2	2.6	CAPITOL	N/O COLLEGE	E	.63
48	12/06/77	3	1.5	3.3	2.4	CAPITOL	N/O COLLEGE	E	.45
49	12/07/77	3	1.5	1.3	1.4	CAPITOL	N/O COLLEGE	E	1.15
50	12/08/77	3	1.2	2.5	1.8	CAPITOL	N/O COLLEGE	E	.48
51	12/09/77	3	5.0	2.0	3.5	CAPITOL	N/O COLLEGE	E	2.50
52	12/12/77	3	1.1	1.2	1.2	CAPITOL	N/O COLLEGE	E	.92
53	12/13/77	3	.3	1.0	.7	CAPITOL	N/O COLLEGE	E	.30
54	12/14/77	3	1.2	1.3	1.3	CAPITOL	N/O COLLEGE	E	.92
55	12/15/77	3	1.2	2.2	1.7	CAPITOL	N/O COLLEGE	E	.55
56	12/16/77	3	1.1	1.3	1.2	CAPITOL	N/O COLLEGE	E	.85
57	12/19/77	3	1.9	2.4	2.2	CAPITOL	N/O COLLEGE	E	.79
58	12/20/77	3	2.0	.9	1.5	CAPITOL	N/O COLLEGE	E	2.22
59	12/21/77	3	2.3	3.2	2.7	CAPITOL	N/O COLLEGE	E	.72
60	12/22/77	3	4.0	4.0	4.0	CAPITOL	N/O COLLEGE	E	1.00

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
61	11/25/77	4	6.6	5.2	5.9	CAPITOL	N/O BROAD	U	1.27
62	11/25/77	4	5.5	2.9	4.2	CAPITOL	N/O BROAD	U	1.90
63	11/29/77	4	8.2	2.6	5.4	CAPITOL	N/O BROAD	U	3.15
64	11/30/77	4	7.5	2.6	5.1	CAPITOL	N/O BROAD	U	2.88
65	12/01/77	4	4.2	6.0	5.1	CAPITOL	N/O BROAD	U	.70
66	12/02/77	4	9.0	10.0	9.5	CAPITOL	N/O BROAD	U	.90
67	12/05/77	4	8.0	3.5	5.8	CAPITOL	N/O BROAD	U	2.29
68	12/06/77	4	5.5	6.5	6.0	CAPITOL	N/O BROAD	U	.85
69	12/07/77	4	2.9	2.2	2.6	CAPITOL	N/O BROAD	U	1.32
70	12/08/77	4	4.2	2.5	3.3	CAPITOL	N/O BROAD	U	1.68
71	12/09/77	4	5.6	4.6	5.1	CAPITOL	N/O BROAD	U	1.22
72	12/12/77	4	8.7	5.1	6.9	CAPITOL	N/O BROAD	U	1.71
73	12/13/77	4	2.1	2.6	2.4	CAPITOL	N/O BROAD	U	.81
74	12/14/77	4	7.0	4.3	5.7	CAPITOL	N/O BROAD	U	1.63
75	12/15/77	4	2.8	2.7	2.7	CAPITOL	N/O BROAD	U	1.04
76	12/16/77	4	4.0	5.9	5.0	CAPITOL	N/O BROAD	U	.68
77	12/19/77	4	3.8	2.4	3.1	CAPITOL	N/O BROAD	U	1.58
78	12/20/77	4	4.9	4.0	4.5	CAPITOL	N/O BROAD	U	1.23
79	12/21/77	4	4.8	4.3	4.6	CAPITOL	N/O BROAD	U	1.12
80	12/22/77	4	5.2	3.9	4.6	CAPITOL	N/O BROAD	U	1.33
81	11/25/77	5	9.8	11.5	10.7	CAPITOL	N/O IDAHO	U	.85
82	11/28/77	5	5.9	8.1	7.0	CAPITOL	N/O IDAHO	U	.73
83	11/29/77	5	9.0	4.3	6.7	CAPITOL	N/O IDAHO	U	2.09
84	11/30/77	5	8.2	4.6	6.4	CAPITOL	N/O IDAHO	U	1.78
85	12/01/77	5	2.9	6.1	4.5	CAPITOL	N/O IDAHO	U	.48
86	12/02/77	5	11.5	15.5	13.5	CAPITOL	N/O IDAHO	U	.74
87	12/05/77	5	8.1	7.2	7.7	CAPITOL	N/O IDAHO	U	1.13
88	12/06/77	5	6.9	9.4	8.1	CAPITOL	N/O IDAHO	U	.73
89	12/07/77	5	3.9	3.3	3.6	CAPITOL	N/O IDAHO	U	1.18
90	12/08/77	5	5.2	6.1	5.7	CAPITOL	N/O IDAHO	U	.85
91	12/09/77	5	7.8	2.2	5.0	CAPITOL	N/O IDAHO	U	3.55
92	12/12/77	5	7.9	6.0	7.0	CAPITOL	N/O IDAHO	U	1.32
93	12/13/77	5	1.8	1.1	1.5	CAPITOL	N/O IDAHO	U	1.64
94	12/14/77	5	3.1	2.3	2.7	CAPITOL	N/O IDAHO	U	1.35
95	12/15/77	5	5.9	7.2	6.6	CAPITOL	N/O IDAHO	U	.82
96	12/16/77	5	5.5	5.3	5.4	CAPITOL	N/O IDAHO	U	1.04
97	12/19/77	5	7.2	7.9	7.6	CAPITOL	N/O IDAHO	U	.91
98	12/20/77	5	5.0	3.2	4.1	CAPITOL	N/O IDAHO	U	1.56
99	12/21/77	5	5.0	7.8	6.4	CAPITOL	N/O IDAHO	U	.64
100	12/22/77	5	9.8	13.8	11.8	CAPITOL	N/O IDAHO	U	.71
101	11/25/77	6	6.1	11.0	8.6	8TH	N/O IDAHO	E	.55
102	11/28/77	6	2.9	3.2	3.1	8TH	N/O IDAHO	E	.91
103	11/29/77	6	7.3	3.2	5.3	8TH	N/O IDAHO	E	2.28
104	11/30/77	6	4.9	5.3	5.1	8TH	N/O IDAHO	E	.92
105	12/01/77	6	6.0	.0	.0	8TH	N/O IDAHO	E	.00
106	12/02/77	6	11.0	9.9	10.5	8TH	N/O IDAHO	E	1.11
107	12/05/77	6	4.9	5.9	5.4	8TH	N/O IDAHO	E	.83
108	12/06/77	6	7.9	10.8	9.4	8TH	N/O IDAHO	E	.73
109	12/07/77	6	2.0	1.7	1.8	8TH	N/O IDAHO	E	1.18
110	12/08/77	6	4.0	2.6	3.3	8TH	N/O IDAHO	E	1.54
111	12/09/77	6	4.0	5.7	4.9	8TH	N/O IDAHO	E	.70
112	12/12/77	6	7.5	.0	.0	8TH	N/O IDAHO	E	.00
113	12/13/77	6	3.3	4.9	4.1	8TH	N/O IDAHO	E	.67
114	12/14/77	6	4.2	8.9	6.5	8TH	N/O IDAHO	E	.47
115	12/15/77	6	2.1	2.9	2.5	8TH	N/O IDAHO	E	.72
116	12/16/77	6	2.7	8.1	5.4	8TH	N/O IDAHO	E	.33
117	12/19/77	6	3.1	2.3	2.7	8TH	N/O IDAHO	E	1.35
118	12/20/77	6	4.9	7.4	6.2	8TH	N/O IDAHO	E	.66
119	12/21/77	6	3.5	5.3	4.4	8TH	N/O IDAHO	E	.66
120	12/22/77	6	4.6	4.2	4.4	8TH	N/O IDAHO	E	1.10

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
121	11/25/77	7	9.2	.0	.0	8TH	N/O MAIN	E	.00
122	11/28/77	7	5.5	.0	.0	8TH	N/O MAIN	E	.00
123	11/29/77	7	9.2	.0	.0	8TH	N/O MAIN	E	.00
124	11/30/77	7	7.1	9.6	8.4	8TH	N/O MAIN	E	.74
125	12/01/77	7	4.0	5.9	5.0	8TH	N/O MAIN	E	.68
126	12/02/77	7	.0	12.8	.0	8TH	N/O MAIN	E	.00
127	12/05/77	7	7.0	7.0	7.0	8TH	N/O MAIN	E	1.00
128	12/06/77	7	7.0	8.5	7.8	8TH	N/O MAIN	E	.82
129	12/07/77	7	5.0	3.7	4.4	8TH	N/O MAIN	E	1.35
130	12/08/77	7	4.3	.0	.0	8TH	N/O MAIN	E	.00
131	12/09/77	7	7.5	8.0	7.8	8TH	N/O MAIN	E	.94
132	12/12/77	7	7.8	8.4	8.1	8TH	N/O MAIN	E	.93
133	12/13/77	7	1.9	3.7	2.8	8TH	N/O MAIN	E	.51
134	12/14/77	7	6.5	5.7	6.1	8TH	N/O MAIN	E	1.14
135	12/15/77	7	5.7	5.8	5.8	8TH	N/O MAIN	E	.98
136	12/16/77	7	4.8	9.1	7.0	8TH	N/O MAIN	E	.53
137	12/19/77	7	6.1	7.9	7.0	8TH	N/O MAIN	E	.77
138	12/20/77	7	.0	6.3	.0	8TH	N/O MAIN	E	.00
139	12/21/77	7	.0	9.1	.0	8TH	N/O MAIN	E	.00
140	12/22/77	7	.0	9.7	.0	8TH	N/O MAIN	E	.00
141	11/25/77	8	12.0	14.0	13.0	MAIN	U/O 8TH	N	.86
142	11/28/77	8	6.0	7.0	6.5	MAIN	U/O 8TH	N	.86
143	11/29/77	8	11.0	4.9	8.0	MAIN	U/O 8TH	N	2.24
144	11/30/77	8	.0	.0	.0	MAIN	U/O 8TH	N	.00
145	12/01/77	8	4.2	6.9	5.6	MAIN	U/O 8TH	N	.61
146	12/02/77	8	.0	16.0	.0	MAIN	U/O 8TH	N	.00
147	12/05/77	8	.0	8.2	.0	MAIN	U/O 8TH	N	.00
148	12/06/77	8	.0	8.7	.0	MAIN	U/O 8TH	N	.00
149	12/07/77	8	4.1	4.9	4.5	MAIN	U/O 8TH	N	.84
150	12/08/77	8	5.8	4.2	5.0	MAIN	U/O 8TH	N	1.38
151	12/09/77	8	7.1	1.0	4.1	MAIN	U/O 8TH	N	7.10
152	12/12/77	8	9.5	6.6	8.1	MAIN	U/O 8TH	N	1.44
153	12/13/77	8	.0	3.2	.0	MAIN	U/O 8TH	N	.00
154	12/14/77	8	.0	4.7	.0	MAIN	U/O 8TH	N	.00
155	12/15/77	8	3.9	6.1	5.0	MAIN	U/O 8TH	N	.64
156	12/16/77	8	7.0	7.2	7.1	MAIN	U/O 8TH	N	.97
157	12/19/77	8	.0	7.1	.0	MAIN	U/O 8TH	N	.00
158	12/20/77	8	.0	3.7	.0	MAIN	U/O 8TH	N	.00
159	12/21/77	8	6.8	10.7	8.8	MAIN	U/O 8TH	N	.64
160	12/22/77	8	6.8	11.1	9.0	MAIN	U/O 8TH	N	.61
161	11/25/77	9	10.0	.0	.0	9TH	N/O MAIN	E	.00
162	11/28/77	9	4.9	10.1	7.5	9TH	N/O MAIN	E	.49
163	11/29/77	9	11.0	7.1	9.1	9TH	N/O MAIN	E	1.55
164	11/30/77	9	8.0	8.9	8.5	9TH	N/O MAIN	E	.90
165	12/01/77	9	7.5	11.0	9.3	9TH	N/O MAIN	E	.68
166	12/02/77	9	14.2	13.0	13.6	9TH	N/O MAIN	E	1.09
167	12/05/77	9	7.0	8.5	7.8	9TH	N/O MAIN	E	.82
168	12/06/77	9	10.5	13.3	11.9	9TH	N/O MAIN	E	.79
169	12/07/77	9	3.6	.0	.0	9TH	N/O MAIN	E	.00
170	12/08/77	9	5.0	7.3	6.2	9TH	N/O MAIN	E	.68
171	12/09/77	9	7.0	8.7	7.9	9TH	N/O MAIN	E	.80
172	12/12/77	9	10.1	11.6	10.9	9TH	N/O MAIN	E	.87
173	12/13/77	9	3.0	.0	.0	9TH	N/O MAIN	E	.00
174	12/14/77	9	10.0	8.1	9.1	9TH	N/O MAIN	E	1.23
175	12/15/77	9	5.8	6.6	6.2	9TH	N/O MAIN	E	.88
176	12/16/77	9	5.0	5.6	5.3	9TH	N/O MAIN	E	.89
177	12/19/77	9	5.9	6.4	6.2	9TH	N/O MAIN	E	.92
178	12/20/77	9	7.0	9.7	8.4	9TH	N/O MAIN	E	.72
179	12/21/77	9	6.0	8.3	7.2	9TH	N/O MAIN	E	.72
180	12/22/77	9	8.1	8.1	8.1	9TH	N/O MAIN	E	1.00

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 Contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
181	11/25/77	11	8.0	10.2	9.1	9TH	N/O IDAHO	E	.78
182	11/28/77	11	4.2	4.9	4.6	9TH	N/O IDAHO	E	.86
183	11/29/77	11	11.0	2.5	6.8	9TH	N/O IDAHO	E	4.40
184	11/30/77	11	6.2	2.7	4.5	9TH	N/O IDAHO	E	2.30
185	12/01/77	11	11.2	14.5	12.9	9TH	N/O IDAHO	E	.77
186	12/02/77	11	13.2	18.0	15.6	9TH	N/O IDAHO	E	.73
187	12/05/77	11	10.0	.0	.0	9TH	N/O IDAHO	E	.00
188	12/06/77	11	11.7	14.9	13.3	9TH	N/O IDAHO	E	.79
189	12/07/77	11	2.0	1.9	2.0	9TH	N/O IDAHO	E	1.05
190	12/08/77	11	4.1	4.1	4.1	9TH	N/O IDAHO	E	1.00
191	12/09/77	11	.0	.0	.0	9TH	N/O IDAHO	E	.00
192	12/12/77	11	10.9	8.8	9.9	9TH	N/O IDAHO	E	1.24
193	12/13/77	11	8.5	11.1	9.8	9TH	N/O IDAHO	E	.77
194	12/14/77	11	12.5	11.2	11.9	9TH	N/O IDAHO	E	1.12
195	12/15/77	11	3.5	4.0	3.7	9TH	N/O IDAHO	E	.88
196	12/16/77	11	3.0	11.3	7.2	9TH	N/O IDAHO	E	.27
197	12/19/77	11	5.3	3.4	4.4	9TH	N/O IDAHO	E	1.56
198	12/20/77	11	5.0	15.1	10.1	9TH	N/O IDAHO	E	.33
199	12/21/77	11	5.4	8.5	7.0	9TH	N/O IDAHO	E	.64
200	12/22/77	11	4.2	8.2	6.2	9TH	N/O IDAHO	E	.51
201	11/25/77	12	6.3	10.9	8.6	STATE	W/O 8TH	S	.58
202	11/28/77	12	.0	3.2	.0	STATE	W/O 8TH	S	.00
203	11/29/77	12	.0	4.1	.0	STATE	W/O 8TH	S	.00
204	11/30/77	12	.0	5.3	.0	STATE	W/O 8TH	S	.00
205	12/01/77	12	2.7	5.2	4.0	STATE	W/O 8TH	S	.52
206	12/02/77	12	6.0	12.9	9.5	STATE	W/O 8TH	S	.47
207	12/05/77	12	6.1	4.9	5.5	STATE	W/O 8TH	S	1.24
208	12/06/77	12	5.7	7.3	6.5	STATE	W/O 8TH	S	.78
209	12/07/77	12	4.5	3.1	3.8	STATE	W/O 8TH	S	1.45
210	12/08/77	12	3.0	6.9	5.0	STATE	W/O 8TH	S	.43
211	12/09/77	12	5.5	5.0	5.3	STATE	W/O 8TH	S	1.10
212	12/12/77	12	5.9	6.0	6.0	STATE	W/O 8TH	S	.98
213	12/13/77	12	1.3	4.0	2.7	STATE	W/O 8TH	S	.33
214	12/14/77	12	4.5	4.7	4.6	STATE	W/O 8TH	S	.96
215	12/15/77	12	4.0	3.8	3.9	STATE	W/O 8TH	S	1.05
216	12/16/77	12	2.5	3.7	3.1	STATE	W/O 8TH	S	.68
217	12/19/77	12	4.1	5.2	4.7	STATE	W/O 8TH	S	.79
218	12/20/77	12	4.0	3.9	4.0	STATE	W/O 8TH	S	1.03
219	12/21/77	12	5.0	5.3	5.2	STATE	W/O 8TH	S	.94
220	12/22/77	12	4.0	7.8	5.9	STATE	W/O 8TH	S	.51
221	11/25/77	13	15.1	.0	.0	9TH	N/O MAIN	W	.00
222	11/28/77	13	9.5	11.8	10.7	9TH	N/O MAIN	W	.81
223	11/29/77	13	8.5	12.2	10.4	9TH	N/O MAIN	W	.70
224	11/30/77	13	9.0	12.5	10.8	9TH	N/O MAIN	W	.72
225	12/01/77	13	2.9	5.2	4.1	9TH	N/O MAIN	W	.56
226	12/02/77	13	9.9	13.0	11.5	9TH	N/O MAIN	W	.76
227	12/05/77	13	10.0	.0	.0	9TH	N/O MAIN	W	.00
228	12/06/77	13	6.6	7.8	7.2	9TH	N/O MAIN	W	.85
229	12/07/77	13	6.6	6.3	6.5	9TH	N/O MAIN	W	1.05
230	12/08/77	13	8.2	10.6	9.4	9TH	N/O MAIN	W	.77
231	12/09/77	13	10.0	12.1	11.1	9TH	N/O MAIN	W	.83
232	12/12/77	13	4.8	7.7	6.3	9TH	N/O MAIN	W	.62
233	12/13/77	13	1.8	3.7	2.7	9TH	N/O MAIN	W	.49
234	12/14/77	13	4.5	3.2	3.9	9TH	N/O MAIN	W	1.41
235	12/15/77	13	8.0	11.5	9.8	9TH	N/O MAIN	W	.70
236	12/16/77	13	7.5	5.6	6.6	9TH	N/O MAIN	W	1.34
237	12/19/77	13	11.0	13.7	12.4	9TH	N/O MAIN	W	.80
238	12/20/77	13	5.0	3.1	4.1	9TH	N/O MAIN	W	1.61
239	12/21/77	13	9.0	11.3	10.2	9TH	N/O MAIN	W	.80
240	12/22/77	13	13.1	15.2	14.2	9TH	N/O MAIN	W	.86

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
241	11/25/77	14	12.1	10.2	11.2	MAIN	U/O 9TH	N	1.19
242	11/28/77	14	4.0	3.2	3.6	MAIN	U/O 9TH	N	1.25
243	11/29/77	14	8.4	5.8	7.1	MAIN	U/O 9TH	N	1.45
244	11/30/77	14	7.0	7.1	7.1	MAIN	U/O 9TH	N	.99
245	12/01/77	14	5.0	8.1	6.6	MAIN	U/O 9TH	N	.62
246	12/02/77	14	4.2	11.5	7.9	MAIN	U/O 9TH	N	.37
247	12/05/77	14	6.7	8.0	7.4	MAIN	U/O 9TH	N	.84
248	12/06/77	14	6.0	8.2	7.1	MAIN	U/O 9TH	N	.73
249	12/07/77	14	4.3	5.0	4.7	MAIN	U/O 9TH	N	.86
250	12/08/77	14	3.8	5.9	4.9	MAIN	U/O 9TH	N	.64
251	12/09/77	14	5.9	8.2	7.1	MAIN	U/O 9TH	N	.72
252	12/12/77	14	6.1	6.4	6.3	MAIN	U/O 9TH	N	.95
253	12/13/77	14	2.0	2.8	2.4	MAIN	U/O 9TH	N	.71
254	12/14/77	14	5.1	4.0	4.6	MAIN	U/O 9TH	N	1.27
255	12/15/77	14	5.0	5.1	5.1	MAIN	U/O 9TH	N	.98
256	12/16/77	14	6.1	6.1	6.1	MAIN	U/O 9TH	N	1.00
257	12/19/77	14	6.2	7.2	6.7	MAIN	U/O 9TH	N	.86
258	12/20/77	14	6.9	.0	.0	MAIN	U/O 9TH	N	.00
259	12/21/77	14	7.0	8.5	7.8	MAIN	U/O 9TH	N	.82
260	12/22/77	14	.0	9.5	.0	MAIN	U/O 9TH	N	.00
261	11/25/77	15	.0	7.2	.0	MAIN	U/O 9TH	S	.00
262	11/28/77	15	5.5	.0	.0	MAIN	U/O 9TH	S	.00
263	11/29/77	15	7.2	.0	.0	MAIN	U/O 9TH	S	.00
264	11/30/77	15	8.0	7.0	7.5	MAIN	U/O 9TH	S	1.14
265	12/01/77	15	2.5	5.7	4.1	MAIN	U/O 9TH	S	.44
266	12/02/77	15	5.0	.0	.0	MAIN	U/O 9TH	S	.00
267	12/05/77	15	4.9	7.5	6.2	MAIN	U/O 9TH	S	.65
268	12/06/77	15	4.0	4.1	4.1	MAIN	U/O 9TH	S	.98
269	12/07/77	15	2.0	1.7	1.8	MAIN	U/O 9TH	S	1.18
270	12/08/77	15	3.0	3.2	3.1	MAIN	U/O 9TH	S	.94
271	12/09/77	15	5.5	6.8	6.2	MAIN	U/O 9TH	S	.81
272	12/12/77	15	6.7	5.1	5.9	MAIN	U/O 9TH	S	1.31
273	12/13/77	15	1.0	1.1	1.1	MAIN	U/O 9TH	S	.91
274	12/14/77	15	2.6	2.1	2.4	MAIN	U/O 9TH	S	1.24
275	12/15/77	15	3.2	3.2	3.2	MAIN	U/O 9TH	S	1.00
276	12/16/77	15	3.3	2.9	3.1	MAIN	U/O 9TH	S	1.14
277	12/19/77	15	4.6	5.5	5.1	MAIN	U/O 9TH	S	.84
278	12/20/77	15	4.0	3.2	3.6	MAIN	U/O 9TH	S	1.25
279	12/21/77	15	5.0	6.2	5.6	MAIN	U/O 9TH	S	.81
280	12/22/77	15	8.0	7.2	7.6	MAIN	U/O 9TH	S	1.11
281	11/25/77	16	7.9	9.0	8.5	10TH	N/O IDAHO	U	.88
282	11/28/77	16	5.5	6.0	5.8	10TH	N/O IDAHO	U	.92
283	11/29/77	16	.0	8.1	.0	10TH	N/O IDAHO	U	.00
284	11/30/77	16	3.5	8.2	5.9	10TH	N/O IDAHO	U	.43
285	12/01/77	16	2.5	5.8	4.2	10TH	N/O IDAHO	U	.43
286	12/02/77	16	5.8	14.0	9.9	10TH	N/O IDAHO	U	.41
287	12/05/77	16	7.9	7.2	7.6	10TH	N/O IDAHO	U	1.10
288	12/06/77	16	5.0	7.1	6.1	10TH	N/O IDAHO	U	.70
289	12/07/77	16	2.2	5.2	3.7	10TH	N/O IDAHO	U	.42
290	12/08/77	16	5.5	7.2	6.4	10TH	N/O IDAHO	U	.76
291	12/09/77	16	4.6	5.1	4.9	10TH	N/O IDAHO	U	.90
292	12/12/77	16	5.2	6.2	5.7	10TH	N/O IDAHO	U	.84
293	12/13/77	16	1.0	1.6	1.3	10TH	N/O IDAHO	U	.63
294	12/14/77	16	2.2	2.6	2.4	10TH	N/O IDAHO	U	.85
295	12/15/77	16	6.5	7.4	7.0	10TH	N/O IDAHO	U	.88
296	12/16/77	16	3.1	2.9	3.0	10TH	N/O IDAHO	U	1.07
297	12/19/77	16	8.0	9.7	8.9	10TH	N/O IDAHO	U	.82
298	12/20/77	16	3.0	2.4	2.7	10TH	N/O IDAHO	U	1.25
299	12/21/77	16	4.5	6.6	5.6	10TH	N/O IDAHO	U	.68
300	12/22/77	16	10.0	8.7	9.4	10TH	N/O IDAHO	U	1.15

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
301	11/25/77	17	12.0	15.1	13.6	IDAHO	U/O 10TH	S	.79
302	11/28/77	17	3.5	5.9	4.7	IDAHO	U/O 10TH	S	.59
303	11/29/77	17	2.5	.0	.0	IDAHO	U/O 10TH	S	.00
304	11/30/77	17	3.9	4.1	4.0	IDAHO	U/O 10TH	S	.95
305	12/01/77	17	6.5	10.1	8.3	IDAHO	U/O 10TH	S	.64
306	12/02/77	17	13.9	16.5	15.2	IDAHO	U/O 10TH	S	.84
307	12/05/77	17	.0	5.1	.0	IDAHO	U/O 10TH	S	.00
308	12/06/77	17	9.1	11.2	10.2	IDAHO	U/O 10TH	S	.81
309	12/07/77	17	2.0	.0	.0	IDAHO	U/O 10TH	S	.00
310	12/08/77	17	4.9	4.5	4.7	IDAHO	U/O 10TH	S	1.09
311	12/09/77	17	5.5	7.1	6.3	IDAHO	U/O 10TH	S	.77
312	12/12/77	17	2.2	9.1	5.7	IDAHO	U/O 10TH	S	.24
313	12/13/77	17	2.5	3.9	3.2	IDAHO	U/O 10TH	S	.64
314	12/14/77	17	7.9	5.5	6.7	IDAHO	U/O 10TH	S	1.44
315	12/15/77	17	5.0	5.2	5.1	IDAHO	U/O 10TH	S	.96
316	12/16/77	17	4.0	7.0	5.5	IDAHO	U/O 10TH	S	.57
317	12/19/77	17	5.2	.0	.0	IDAHO	U/O 10TH	S	.00
318	12/20/77	17	5.2	6.5	5.9	IDAHO	U/O 10TH	S	.80
319	12/21/77	17	4.2	4.8	4.5	IDAHO	U/O 10TH	S	.87
320	12/22/77	17	7.5	7.8	7.7	IDAHO	U/O 10TH	S	.96
321	11/25/77	18	12.8	11.3	12.1	MAIN	U/O 10TH	N	1.13
322	11/28/77	18	7.2	7.6	7.4	MAIN	U/O 10TH	N	.95
323	11/29/77	18	8.4	7.2	7.8	MAIN	U/O 10TH	N	1.17
324	11/30/77	18	7.8	9.2	8.5	MAIN	U/O 10TH	N	.85
325	12/01/77	18	9.9	11.6	10.8	MAIN	U/O 10TH	N	.85
326	12/02/77	18	15.6	14.9	15.3	MAIN	U/O 10TH	N	1.05
327	12/05/77	18	.0	8.1	.0	MAIN	U/O 10TH	N	.00
328	12/06/77	18	9.0	11.8	10.4	MAIN	U/O 10TH	N	.76
329	12/07/77	18	6.5	6.3	6.4	MAIN	U/O 10TH	N	1.03
330	12/08/77	18	5.1	6.1	5.6	MAIN	U/O 10TH	N	.84
331	12/09/77	18	6.2	5.3	5.8	MAIN	U/O 10TH	N	1.17
332	12/12/77	18	7.9	10.6	9.3	MAIN	U/O 10TH	N	.75
333	12/13/77	18	5.0	6.3	5.7	MAIN	U/O 10TH	N	.79
334	12/14/77	18	10.5	8.2	9.4	MAIN	U/O 10TH	N	1.28
335	12/15/77	18	5.0	5.2	5.1	MAIN	U/O 10TH	N	.96
336	12/16/77	18	7.0	10.0	8.5	MAIN	U/O 10TH	N	.70
337	12/19/77	18	7.6	7.3	7.5	MAIN	U/O 10TH	N	1.04
338	12/20/77	18	6.8	7.2	7.0	MAIN	U/O 10TH	N	.94
339	12/21/77	18	7.5	8.6	8.1	MAIN	U/O 10TH	N	.87
340	12/22/77	18	11.3	11.1	11.2	MAIN	U/O 10TH	N	1.02
341	11/25/77	19	11.3	9.1	10.2	11TH	N/O MAIN	U	1.24
342	11/28/77	19	8.0	11.0	9.5	11TH	N/O MAIN	U	.73
343	11/29/77	19	7.8	7.0	7.4	11TH	N/O MAIN	U	1.11
344	11/30/77	19	8.0	10.3	9.2	11TH	N/O MAIN	U	.78
345	12/01/77	19	4.9	6.8	5.9	11TH	N/O MAIN	U	.72
346	12/02/77	19	11.0	13.1	12.1	11TH	N/O MAIN	U	.84
347	12/05/77	19	5.9	7.4	6.7	11TH	N/O MAIN	U	.80
348	12/06/77	19	7.0	8.9	8.0	11TH	N/O MAIN	U	.79
349	12/07/77	19	6.0	6.3	6.2	11TH	N/O MAIN	U	.95
350	12/08/77	19	4.0	5.3	4.7	11TH	N/O MAIN	U	.75
351	12/09/77	19	8.0	7.1	7.6	11TH	N/O MAIN	U	1.13
352	12/12/77	19	6.8	5.1	6.0	11TH	N/O MAIN	U	1.33
353	12/13/77	19	2.5	3.2	2.9	11TH	N/O MAIN	U	.78
354	12/14/77	19	7.0	5.2	6.1	11TH	N/O MAIN	U	1.35
355	12/15/77	19	7.0	5.6	6.3	11TH	N/O MAIN	U	1.25
356	12/16/77	19	6.0	6.0	6.0	11TH	N/O MAIN	U	1.00
357	12/19/77	19	7.0	6.5	6.8	11TH	N/O MAIN	U	1.08
358	12/20/77	19	2.2	3.7	3.0	11TH	N/O MAIN	U	.59
359	12/21/77	19	7.5	7.0	7.3	11TH	N/O MAIN	U	1.07
360	12/22/77	19	9.0	10.7	9.9	11TH	N/O MAIN		

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
361	11/25/77	20	9.0	13.5	11.3	MAIN	W/O 11TH	S	.67
362	11/28/77	20	4.9	.0	.0	MAIN	W/O 11TH	S	.00
363	11/29/77	20	10.2	5.4	7.8	MAIN	W/O 11TH	S	1.89
364	11/30/77	20	4.0	12.3	8.2	MAIN	W/O 11TH	S	.33
365	12/01/77	20	9.5	12.5	11.0	MAIN	W/O 11TH	S	.76
366	12/02/77	20	16.5	11.1	13.8	MAIN	W/O 11TH	S	1.49
367	12/05/77	20	8.0	9.1	8.6	MAIN	W/O 11TH	S	.88
368	12/06/77	20	11.0	12.0	11.5	MAIN	W/O 11TH	S	.92
369	12/07/77	20	3.2	2.7	3.0	MAIN	W/O 11TH	S	1.19
370	12/08/77	20	5.0	5.3	5.2	MAIN	W/O 11TH	S	.94
371	12/09/77	20	6.6	7.2	6.9	MAIN	W/O 11TH	S	.92
372	12/12/77	20	8.8	9.1	9.0	MAIN	W/O 11TH	S	.97
373	12/13/77	20	3.5	4.1	3.8	MAIN	W/O 11TH	S	.85
374	12/14/77	20	11.0	7.2	9.1	MAIN	W/O 11TH	S	1.53
375	12/15/77	20	7.0	4.1	5.6	MAIN	W/O 11TH	S	1.71
376	12/16/77	20	5.4	4.0	4.7	MAIN	W/O 11TH	S	1.35
377	12/19/77	20	6.0	8.8	7.4	MAIN	W/O 11TH	S	.68
378	12/20/77	20	8.0	12.1	10.1	MAIN	W/O 11TH	S	.66
379	12/21/77	20	6.0	8.5	7.3	MAIN	W/O 11TH	S	.71
380	12/22/77	20	9.0	10.1	9.6	MAIN	W/O 11TH	S	.89
381	11/25/77	21	4.9	11.2	8.1	13TH	N/O IDAHO	E	.44
382	11/28/77	21	1.9	4.7	3.3	13TH	N/O IDAHO	E	.40
383	11/29/77	21	6.0	2.2	4.1	13TH	N/O IDAHO	E	2.73
384	11/30/77	21	4.0	3.5	3.7	13TH	N/O IDAHO	E	1.14
385	12/01/77	21	6.7	10.0	8.4	13TH	N/O IDAHO	E	.67
386	12/02/77	21	9.0	10.8	9.9	13TH	N/O IDAHO	E	.83
387	12/05/77	21	3.7	7.4	5.6	13TH	N/O IDAHO	E	.50
388	12/06/77	21	7.0	9.0	8.0	13TH	N/O IDAHO	E	.78
389	12/07/77	21	2.0	2.1	2.0	13TH	N/O IDAHO	E	.95
390	12/08/77	21	1.9	4.4	3.2	13TH	N/O IDAHO	E	.43
391	12/09/77	21	3.0	4.5	3.7	13TH	N/O IDAHO	E	.67
392	12/12/77	21	5.0	7.0	6.0	13TH	N/O IDAHO	E	.71
393	12/13/77	21	4.5	4.1	4.3	13TH	N/O IDAHO	E	1.10
394	12/14/77	21	8.1	6.2	7.2	13TH	N/O IDAHO	E	1.31
395	12/15/77	21	3.0	3.3	3.2	13TH	N/O IDAHO	E	.91
396	12/16/77	21	2.0	4.0	3.0	13TH	N/O IDAHO	E	.50
397	12/19/77	21	3.0	2.8	2.9	13TH	N/O IDAHO	E	1.07
398	12/20/77	21	3.2	5.0	4.1	13TH	N/O IDAHO	E	.64
399	12/21/77	21	3.0	5.0	4.0	13TH	N/O IDAHO	E	.60
400	12/22/77	21	4.5	4.7	4.6	13TH	N/O IDAHO	E	.96
401	11/25/77	22	8.0	10.2	9.1	FRONT	W/O 15TH	N	.78
402	11/28/77	22	5.1	4.1	4.6	FRONT	W/O 15TH	N	1.24
403	11/29/77	22	10.0	3.7	6.9	FRONT	W/O 15TH	N	2.70
404	11/30/77	22	6.9	3.6	5.3	FRONT	W/O 15TH	N	1.92
405	12/01/77	22	4.6	7.0	5.8	FRONT	W/O 15TH	N	.66
406	12/02/77	22	10.2	12.0	11.1	FRONT	W/O 15TH	N	.85
407	12/05/77	22	6.5	4.7	5.6	FRONT	W/O 15TH	N	1.38
408	12/06/77	22	6.1	9.0	7.6	FRONT	W/O 15TH	N	.68
409	12/07/77	22	2.2	2.0	2.1	FRONT	W/O 15TH	N	1.10
410	12/08/77	22	3.8	4.2	4.0	FRONT	W/O 15TH	N	.90
411	12/09/77	22	5.9	6.5	6.2	FRONT	W/O 15TH	N	.91
412	12/12/77	22	8.0	6.2	7.1	FRONT	W/O 15TH	N	1.29
413	12/13/77	22	3.0	2.8	2.9	FRONT	W/O 15TH	N	1.07
414	12/14/77	22	6.6	5.3	6.0	FRONT	W/O 15TH	N	1.25
415	12/15/77	22	5.0	5.2	5.1	FRONT	W/O 15TH	N	.96
416	12/16/77	22	3.9	4.0	4.0	FRONT	W/O 15TH	N	.98
417	12/19/77	22	3.9	4.2	4.1	FRONT	W/O 15TH	N	.93
418	12/20/77	22	4.0	3.8	3.9	FRONT	W/O 15TH	N	1.05
419	12/21/77	22	3.9	6.9	5.4	FRONT	W/O 15TH	N	.57
420	12/22/77	22	7.9	8.8	8.4	FRONT	W/O 15TH	N	.90

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM 1/	PM 2/	AVC 3/	Main Street	Cross Street	Side	Ratio AM/PM
421	11/25/77	23	7.6	11.1	9.4	MAIN	W/O 15TH	S	.68
422	11/28/77	23	.0	5.2	.0	MAIN	W/O 15TH	S	.00
423	11/29/77	23	8.0	3.6	5.8	MAIN	W/O 15TH	S	2.22
424	11/30/77	23	.0	8.7	.0	MAIN	W/O 15TH	S	.00
425	12/01/77	23	14.1	11.8	13.0	MAIN	W/O 15TH	S	1.19
426	12/02/77	23	14.1	9.0	11.6	MAIN	W/O 15TH	S	1.57
427	12/05/77	23	.0	9.8	.0	MAIN	W/O 15TH	S	.00
428	12/06/77	23	9.8	8.0	8.9	MAIN	W/O 15TH	S	1.23
429	12/07/77	23	4.0	4.2	4.1	MAIN	W/O 15TH	S	.95
430	12/08/77	23	4.1	4.3	4.2	MAIN	W/O 15TH	S	.95
431	12/09/77	23	5.7	6.3	6.0	MAIN	W/O 15TH	S	.90
432	12/12/77	23	8.5	7.0	7.8	MAIN	W/O 15TH	S	1.21
433	12/13/77	23	4.3	4.5	4.4	MAIN	W/O 15TH	S	.96
434	12/14/77	23	8.0	7.0	7.5	MAIN	W/O 15TH	S	1.14
435	12/15/77	23	3.3	3.6	3.5	MAIN	W/O 15TH	S	.92
436	12/16/77	23	4.0	6.3	5.2	MAIN	W/O 15TH	S	.63
437	12/19/77	23	5.9	8.3	7.1	MAIN	W/O 15TH	S	.71
438	12/20/77	23	6.0	5.4	5.7	MAIN	W/O 15TH	S	1.11
439	12/21/77	23	5.1	6.4	5.8	MAIN	W/O 15TH	S	.80
440	12/22/77	23	7.0	7.5	7.3	MAIN	W/O 15TH	S	.93
441	11/25/77	24	4.5	9.1	6.8	16TH	N/O MAIN	W	.49
442	11/28/77	24	4.1	3.1	3.6	16TH	N/O MAIN	W	1.32
443	11/29/77	24	6.6	1.1	3.8	16TH	N/O MAIN	W	6.00
444	11/30/77	24	5.2	1.5	3.3	16TH	N/O MAIN	W	3.47
445	12/01/77	24	6.9	8.2	7.6	16TH	N/O MAIN	W	.84
446	12/02/77	24	12.6	17.5	15.1	16TH	N/O MAIN	W	.72
447	12/05/77	24	4.9	4.2	4.6	16TH	N/O MAIN	W	1.17
448	12/06/77	24	8.0	10.1	9.1	16TH	N/O MAIN	W	.79
449	12/07/77	24	1.2	1.0	1.1	16TH	N/O MAIN	W	1.20
450	12/08/77	24	2.6	2.6	2.6	16TH	N/O MAIN	W	1.00
451	12/09/77	24	4.0	2.9	3.5	16TH	N/O MAIN	W	1.38
452	12/12/77	24	7.5	5.2	6.4	16TH	N/O MAIN	W	1.44
453	12/13/77	24	2.5	4.0	3.2	16TH	N/O MAIN	W	.63
454	12/14/77	24	8.0	7.2	7.6	16TH	N/O MAIN	W	1.11
455	12/15/77	24	2.5	3.1	2.8	16TH	N/O MAIN	W	.81
456	12/16/77	24	2.9	6.0	4.5	16TH	N/O MAIN	W	.48
457	12/19/77	24	2.9	2.1	2.5	16TH	N/O MAIN	W	1.38
458	12/20/77	24	4.0	8.0	6.0	16TH	N/O MAIN	W	.50
459	12/21/77	24	3.0	5.2	4.1	16TH	N/O MAIN	W	.58
460	12/22/77	24	4.0	6.1	5.1	16TH	N/O MAIN	W	.66
461	11/25/77	25	8.0	10.0	9.0	23RD	N/O FAIRVIEW	E	.80
462	11/28/77	25	4.9	5.8	5.4	23RD	N/O FAIRVIEW	E	.84
463	11/29/77	25	10.0	4.1	7.1	23RD	N/O FAIRVIEW	E	2.44
464	11/30/77	25	4.9	6.9	5.9	23RD	N/O FAIRVIEW	E	.71
465	12/01/77	25	7.8	10.1	9.0	23RD	N/O FAIRVIEW	E	.77
466	12/02/77	25	11.0	15.8	13.4	23RD	N/O FAIRVIEW	E	.70
467	12/05/77	25	5.9	8.0	7.0	23RD	N/O FAIRVIEW	E	.74
468	12/06/77	25	10.2	11.8	11.0	23RD	N/O FAIRVIEW	E	.86
469	12/07/77	25	4.1	3.5	3.8	23RD	N/O FAIRVIEW	E	1.17
470	12/08/77	25	4.0	5.7	4.9	23RD	N/O FAIRVIEW	E	.70
471	12/09/77	25	5.0	7.2	6.1	23RD	N/O FAIRVIEW	E	.69
472	12/12/77	25	6.0	6.7	6.4	23RD	N/O FAIRVIEW	E	.90
473	12/13/77	25	2.5	3.7	3.1	23RD	N/O FAIRVIEW	E	.68
474	12/14/77	25	10.0	.0	.0	23RD	N/O FAIRVIEW	E	.00
475	12/15/77	25	4.9	7.0	6.0	23RD	N/O FAIRVIEW	E	.70
476	12/16/77	25	4.1	4.2	4.2	23RD	N/O FAIRVIEW	E	.98
477	12/19/77	25	6.3	9.1	7.7	23RD	N/O FAIRVIEW	E	.69
478	12/20/77	25	6.2	5.2	5.7	23RD	N/O FAIRVIEW	E	1.19
479	12/21/77	25	6.0	8.2	7.1	23RD	N/O FAIRVIEW	E	.73
480	12/22/77	25	7.9	10.1	9.0	23RD	N/O FAIRVIEW	E	.78

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
481	11/25/77	26	5.9	11.2	8.6	STATE	W/O 22ND	N	.53
482	11/28/77	26	4.7	7.9	6.3	STATE	W/O 22ND	N	.59
483	11/29/77	26	8.1	4.5	6.3	STATE	W/O 22ND	N	1.80
484	11/30/77	26	4.1	6.1	5.1	STATE	W/O 22ND	N	.67
485	12/01/77	26	3.9	7.0	5.5	STATE	W/O 22ND	N	.56
486	12/02/77	26	7.2	14.0	10.6	STATE	W/O 22ND	N	.51
487	12/05/77	26	4.0	5.2	4.6	STATE	W/O 22ND	N	.77
488	12/06/77	26	7.0	3.0	5.0	STATE	W/O 22ND	N	2.33
489	12/07/77	26	3.0	2.2	2.6	STATE	W/O 22ND	N	1.36
490	12/08/77	26	2.9	4.1	3.5	STATE	W/O 22ND	N	.71
491	12/09/77	26	4.0	3.9	4.0	STATE	W/O 22ND	N	1.03
492	12/12/77	26	4.7	4.7	4.7	STATE	W/O 22ND	N	1.00
493	12/13/77	26	1.5	3.4	2.5	STATE	W/O 22ND	N	.44
494	12/14/77	26	6.0	10.7	8.4	STATE	W/O 22ND	N	.56
495	12/15/77	26	4.0	4.8	4.4	STATE	W/O 22ND	N	.83
496	12/16/77	26	2.6	4.2	3.4	STATE	W/O 22ND	N	.62
497	12/19/77	26	4.0	5.1	4.6	STATE	W/O 22ND	N	.78
498	12/20/77	26	4.6	3.8	4.2	STATE	W/O 22ND	N	1.21
499	12/21/77	26	3.9	5.0	4.5	STATE	W/O 22ND	N	.78
500	12/22/77	26	5.0	7.4	6.2	STATE	W/O 22ND	N	.68
501	11/25/77	32	15.2	17.2	16.2	IDAHO	W/O 8TH	N	.88
502	11/28/77	32	11.5	11.1	11.3	IDAHO	W/O 8TH	N	1.04
503	11/29/77	32	11.0	9.6	10.3	IDAHO	W/O 8TH	N	1.15
504	11/30/77	32	10.0	10.1	10.1	IDAHO	W/O 8TH	N	.99
505	12/01/77	32	6.0	6.7	6.4	IDAHO	W/O 8TH	N	.90
506	12/02/77	32	14.9	18.0	16.5	IDAHO	W/O 8TH	N	.83
507	12/05/77	32	10.0	14.1	12.1	IDAHO	W/O 8TH	N	.71
508	12/06/77	32	9.0	13.2	11.1	IDAHO	W/O 8TH	N	.68
509	12/07/77	32	9.0	8.4	8.7	IDAHO	W/O 8TH	N	1.07
510	12/08/77	32	7.0	10.3	8.7	IDAHO	W/O 8TH	N	.68
511	12/09/77	32	11.1	13.1	12.1	IDAHO	W/O 8TH	N	.85
512	12/12/77	32	8.9	10.5	9.7	IDAHO	W/O 8TH	N	.85
513	12/13/77	32	3.0	5.0	4.0	IDAHO	W/O 8TH	N	.60
514	12/14/77	32	9.6	6.9	8.3	IDAHO	W/O 8TH	N	1.39
515	12/15/77	32	8.0	11.7	9.9	IDAHO	W/O 8TH	N	.68
516	12/16/77	32	9.2	12.8	11.0	IDAHO	W/O 8TH	N	.72
517	12/19/77	32	11.1	13.4	12.3	IDAHO	W/O 8TH	N	.83
518	12/20/77	32	8.9	5.8	7.4	IDAHO	W/O 8TH	N	1.53
519	12/21/77	32	11.0	14.2	12.6	IDAHO	W/O 8TH	N	.77
520	12/22/77	32	14.6	19.9	17.2	IDAHO	W/O 8TH	N	.73
521	11/25/77	10A	11.1	12.1	11.6	IDAHO	W/O 8TH	S	.92
522	11/28/77	10A	6.9	8.5	7.7	IDAHO	W/O 8TH	S	.81
523	11/29/77	10A	12.1	7.1	9.6	IDAHO	W/O 8TH	S	1.70
524	11/30/77	10A	8.9	7.0	8.0	IDAHO	W/O 8TH	S	1.27
525	12/01/77	10A	8.7	7.1	7.9	IDAHO	W/O 8TH	S	1.23
526	12/02/77	10A	11.2	20.6	15.9	IDAHO	W/O 8TH	S	.54
527	12/05/77	10A	13.5	12.9	13.2	IDAHO	W/O 8TH	S	1.05
528	12/06/77	10A	12.2	13.7	13.0	IDAHO	W/O 8TH	S	.89
529	12/07/77	10A	5.3	3.9	4.6	IDAHO	W/O 8TH	S	1.36
530	12/08/77	10A	7.2	8.8	8.0	IDAHO	W/O 8TH	S	.82
531	11/25/77	27A	5.1	6.0	5.6	CAPITOL	N/O COLLEGE	W	.85
532	11/28/77	27A	4.3	4.0	4.2	CAPITOL	N/O COLLEGE	W	1.08
533	11/29/77	27A	8.0	.9	4.5	CAPITOL	N/O COLLEGE	W	8.89
534	11/30/77	27A	3.9	1.9	2.9	CAPITOL	N/O COLLEGE	W	2.05
535	12/01/77	27A	4.5	6.2	5.4	CAPITOL	N/O COLLEGE	W	.73
536	12/02/77	27A	10.1	10.1	10.1	CAPITOL	N/O COLLEGE	W	1.00
537	12/05/77	27A	3.2	2.0	2.6	CAPITOL	N/O COLLEGE	W	1.60
538	12/06/77	27A	5.1	9.2	7.2	CAPITOL	N/O COLLEGE	W	.55
539	12/07/77	27A	1.4	.8	1.1	CAPITOL	N/O COLLEGE	W	1.75
540	12/08/77	27A	2.0	1.7	1.8	CAPITOL	N/O COLLEGE	W	1.18

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
541	12/09/77	27B	3.5	3.7	3.6	13TH	N/O STATE	E	.95
542	12/12/77	27B	4.7	2.9	3.8	13TH	N/O STATE	E	1.62
543	12/13/77	27B	1.0	1.4	1.2	13TH	N/O STATE	E	.71
544	12/14/77	27B	4.2	2.9	3.5	13TH	N/O STATE	E	1.45
545	12/15/77	27B	2.5	3.2	2.9	13TH	N/O STATE	E	.78
546	12/16/77	27B	2.1	1.3	1.7	13TH	N/O STATE	E	1.62
547	12/19/77	27B	2.9	2.4	2.7	13TH	N/O STATE	E	1.21
548	12/20/77	27B	3.1	2.2	2.7	13TH	N/O STATE	E	1.41
549	12/21/77	27B	3.9	4.3	4.1	13TH	N/O STATE	E	.91
550	12/22/77	27B	4.0	6.5	5.3	13TH	N/O STATE	E	.62
551	11/25/77	28A	5.2	.0	.0	MAIN	W/O BROADWAY	N	.00
552	11/28/77	28A	6.9	7.1	7.0	MAIN	W/O BROADWAY	N	.97
553	11/29/77	28A	10.0	6.0	8.0	MAIN	W/O BROADWAY	N	1.67
554	11/30/77	28A	9.5	6.1	7.8	MAIN	W/O BROADWAY	N	1.56
555	12/01/77	28A	4.9	6.8	5.9	MAIN	W/O BROADWAY	N	.72
556	12/02/77	28A	6.0	9.9	8.0	MAIN	W/O BROADWAY	N	.61
557	12/05/77	28A	3.2	7.2	5.2	MAIN	W/O BROADWAY	N	.44
558	12/06/77	28A	5.5	9.7	7.6	MAIN	W/O BROADWAY	N	.57
559	12/07/77	28A	2.2	2.7	2.5	MAIN	W/O BROADWAY	N	.81
560	12/08/77	28A	2.0	4.2	3.1	MAIN	W/O BROADWAY	N	.48
561	12/09/77	28B	3.5	4.9	4.2	16TH	N/O STATE	E	.71
562	12/12/77	28B	4.8	5.2	5.0	16TH	N/O STATE	E	.92
563	12/13/77	28B	2.0	.0	.0	16TH	N/O STATE	E	.00
564	12/14/77	28B	8.0	4.8	6.4	16TH	N/O STATE	E	1.67
565	12/15/77	28B	3.9	3.5	3.7	16TH	N/O STATE	E	1.11
566	12/16/77	28B	3.0	3.0	3.0	16TH	N/O STATE	E	1.00
567	12/19/77	28B	3.2	3.7	3.5	16TH	N/O STATE	E	.86
568	12/20/77	28B	9.0	3.1	6.1	16TH	N/O STATE	E	2.90
569	12/21/77	28B	5.0	5.2	5.1	16TH	N/O STATE	E	.96
570	12/22/77	28B	6.2	9.3	7.8	16TH	N/O STATE	E	.67
571	11/25/77	29A	6.8	5.9	6.4	1ST	N/O IDAHO	W	1.15
572	11/28/77	29A	5.9	3.9	4.9	1ST	N/O IDAHO	W	1.51
573	11/29/77	29A	7.8	2.6	5.2	1ST	N/O IDAHO	W	3.00
574	11/30/77	29A	8.9	2.9	5.9	1ST	N/O IDAHO	W	3.07
575	12/01/77	29A	4.1	6.7	5.4	1ST	N/O IDAHO	W	.61
576	12/02/77	29A	9.0	9.9	9.5	1ST	N/O IDAHO	W	.91
577	12/05/77	29A	5.2	2.5	3.8	1ST	N/O IDAHO	W	2.08
578	12/06/77	29A	7.0	9.9	8.5	1ST	N/O IDAHO	W	.71
579	12/07/77	29A	2.5	1.9	2.2	1ST	N/O IDAHO	W	1.32
580	12/08/77	29A	3.0	4.3	3.7	1ST	N/O IDAHO	W	.70
581	12/09/77	29B	4.2	4.5	4.4	STATE	W/O 18TH	S	.93
582	12/12/77	29B	6.9	3.9	5.4	STATE	W/O 18TH	S	1.77
583	12/13/77	29B	1.8	3.3	2.5	STATE	W/O 18TH	S	.55
584	12/14/77	29B	6.1	3.2	4.7	STATE	W/O 18TH	S	1.91
585	12/15/77	29B	3.0	2.1	2.5	STATE	W/O 18TH	S	1.43
586	12/16/77	29B	2.5	4.1	3.3	STATE	W/O 18TH	S	.61
587	12/19/77	29B	4.0	3.1	3.5	STATE	W/O 18TH	S	1.29
588	12/20/77	29B	7.0	2.3	4.7	STATE	W/O 18TH	S	3.04
589	12/21/77	29B	3.5	3.8	3.7	STATE	W/O 18TH	S	.92
590	12/22/77	29B	5.5	4.3	4.9	STATE	W/O 18TH	S	1.28
591	11/25/77	30A	10.0	12.0	11.0	CAPITOL	N/O MYRTLE	E	.83
592	11/28/77	32A	7.9	11.5	9.7	CAPITOL	N/O MYRTLE	E	.69
593	11/29/77	30A	9.8	6.8	8.3	CAPITOL	N/O MYRTLE	E	1.44
594	11/30/77	30A	2.0	10.8	6.4	CAPITOL	N/O MYRTLE	E	.19
595	12/01/77	30A	5.0	8.2	6.6	CAPITOL	N/O MYRTLE	E	.61
596	12/02/77	30A	11.2	11.5	11.4	CAPITOL	N/O MYRTLE	E	.97
597	12/05/77	30A	6.8	11.1	9.0	CAPITOL	N/O MYRTLE	E	.61
598	12/06/77	30A	6.3	7.6	7.0	CAPITOL	N/O MYRTLE	E	.83
599	12/07/77	30A	3.9	3.2	3.6	CAPITOL	N/O MYRTLE	E	1.22
600	12/08/77	30A	5.5	10.1	7.8	CAPITOL	N/O MYRTLE	E	.54

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-1 contd.

Record No.	Date	Site	AM1/	PM2/	AVC3/	Main Street	Cross Street	Side	Ratio AM/PM
601	12/09/77	30B	2.9	5.0	4.0	STATE	U/O 25TH	S	.58
602	12/12/77	30B	3.4	5.7	4.6	STATE	U/O 25TH	S	.60
603	12/13/77	30B	1.9	2.9	2.4	STATE	U/O 25TH	S	.66
604	12/14/77	30B	8.0	3.9	6.0	STATE	U/O 25TH	S	2.05
605	12/15/77	30B	1.9	2.3	2.1	STATE	U/O 25TH	S	.83
606	12/16/77	30B	3.0	4.9	4.0	STATE	U/O 25TH	S	.61
607	12/19/77	30B	2.1	2.3	2.2	STATE	U/O 25TH	S	.91
608	12/20/77	30B	2.1	2.7	2.4	STATE	U/O 25TH	S	.78
609	12/21/77	30B	3.0	3.5	3.2	STATE	U/O 25TH	S	.86
610	12/22/77	30B	4.0	4.7	4.4	STATE	U/O 25TH	S	.85
611	11/25/77	31A	.0	.0	.0	CAPITOL	N/O MAIN	U	.00
612	11/28/77	31A	6.9	10.5	8.7	CAPITOL	N/O MAIN	U	.66
613	11/29/77	31A	9.7	5.2	7.5	CAPITOL	N/O MAIN	U	1.87
614	11/30/77	31A	9.9	5.1	7.5	CAPITOL	N/O MAIN	U	1.94
615	12/01/77	31A	4.0	6.0	5.0	CAPITOL	N/O MAIN	U	.67
616	12/02/77	31A	6.2	9.2	7.7	CAPITOL	N/O MAIN	U	.67
617	12/05/77	31A	6.3	7.0	6.7	CAPITOL	N/O MAIN	U	.90
618	12/06/77	31A	5.9	6.6	6.3	CAPITOL	N/O MAIN	U	.89
619	12/07/77	31A	4.8	.0	.0	CAPITOL	N/O MAIN	U	.00
620	12/08/77	31A	4.0	5.7	4.9	CAPITOL	N/O MAIN	U	.70
621	12/09/77	31B	.0	5.9	.0	15TH	N/O MAIN	U	.00
622	12/12/77	31B	7.1	4.3	5.7	15TH	N/O MAIN	U	1.65
623	12/13/77	31B	2.0	2.2	2.1	15TH	N/O MAIN	U	.91
624	12/14/77	31B	4.5	5.3	4.9	15TH	N/O MAIN	U	.85
625	12/15/77	31B	4.0	4.8	4.4	15TH	N/O MAIN	U	.83
626	12/16/77	31B	3.9	4.3	4.1	15TH	N/O MAIN	U	.91
627	12/19/77	31B	5.0	4.3	4.7	15TH	N/O MAIN	U	1.16
628	12/20/77	31B	4.1	.0	.0	15TH	N/O MAIN	U	.00
629	12/21/77	31B	4.2	4.3	4.3	15TH	N/O MAIN	U	.98
630	12/22/77	31B	6.0	6.5	6.3	15TH	N/O MAIN	U	.92
631	12/09/77	32B	.0	8.1	.0	16TH	N/O RIVER ROAD	U	.00
632	12/12/77	32B	10.3	9.1	9.7	16TH	N/O RIVER ROAD	U	1.13
633	12/13/77	32B	6.7	2.5	4.6	16TH	N/O RIVER ROAD	U	2.68
634	12/14/77	32B	.0	4.2	.0	16TH	N/O RIVER ROAD	U	.00
635	12/15/77	32B	.0	7.1	.0	16TH	N/O RIVER ROAD	U	.00
636	12/16/77	32B	4.1	5.0	4.6	16TH	N/O RIVER ROAD	U	.82
637	12/19/77	32B	5.0	9.0	7.0	16TH	N/O RIVER ROAD	U	.56
638	12/20/77	32B	3.0	3.1	3.0	16TH	N/O RIVER ROAD	U	.97
639	12/21/77	32B	8.0	6.5	7.3	16TH	N/O RIVER ROAD	U	1.23
640	12/22/77	32B	7.2	9.0	8.1	16TH	N/O RIVER ROAD	U	.80
641	11/25/77	33A	.0	13.3	.0	9TH	N/O MAIN	U	.00
642	11/28/77	33A	8.0	.0	.0	9TH	N/O MAIN	U	.00
643	11/29/77	33A	9.1	9.8	9.5	9TH	N/O MAIN	U	.93
644	11/30/77	33A	9.9	13.3	11.6	9TH	N/O MAIN	U	.74
645	12/01/77	33A	3.2	5.0	4.1	9TH	N/O MAIN	U	.64
646	12/02/77	33A	10.5	.0	.0	9TH	N/O MAIN	U	.00
647	12/05/77	33A	10.0	11.1	10.6	9TH	N/O MAIN	U	.90
648	12/06/77	33A	.0	5.1	.0	9TH	N/O MAIN	U	.00
649	12/07/77	33A	7.2	6.3	6.8	9TH	N/O MAIN	U	1.14
650	12/08/77	33A	6.0	11.2	8.6	9TH	N/O MAIN	U	.54
651	12/09/77	33B	5.1	6.1	5.6	GROVE	U/O 11TH	N	.84
652	12/12/77	33B	7.0	3.8	5.4	GROVE	U/O 11TH	N	1.84
653	12/13/77	33B	3.2	5.8	4.5	GROVE	U/O 11TH	N	.55
654	12/14/77	33B	6.6	10.1	8.4	GROVE	U/O 11TH	N	.65
655	12/15/77	33B	3.1	3.0	3.0	GROVE	U/O 11TH	N	1.03
656	12/16/77	33B	3.0	9.9	6.5	GROVE	U/O 11TH	N	.30
657	12/19/77	33B	5.2	7.0	6.1	GROVE	U/O 11TH	N	.74
658	12/20/77	33B	5.2	9.1	7.2	GROVE	U/O 11TH	N	.57
659	12/21/77	33B	4.9	7.5	6.2	GROVE	U/O 11TH	N	.65
660	12/22/77	33B	5.1	7.0	6.5	GROVE	U/O 11TH	N	.65

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AM - Four-hour average for 10 AM to 2 PM

2/ PM - Four-hour average for 2 PM to 6 PM

3/ AVC - Eight-hour average for 10 AM to 6 PM

TABLE D-2. Ratios of Eight-Hour Averages (EPA Study Sites and the Permanent Monitor) Sorted by EPA Study Site (CO in ppm)

Record No.	Date	Site	AVS1/	AVC2/	Ratio AVC/AVS
1	11/25/77	1	8.8	8.6	1.0
2	11/28/77	1	9.8	10.1	1.0
3	11/29/77	1	8.3	11.0	1.3
4	11/30/77	1	10.7	9.9	.9
5	12/01/77	1	.0	11.6	.0
6	12/02/77	1	10.5	14.7	1.4
7	12/05/77	1	9.9	10.2	1.0
8	12/06/77	1	6.2	12.4	2.0
9	12/07/77	1	6.4	4.6	.7
10	12/08/77	1	7.6	7.5	1.0
11	12/09/77	1	9.7	9.0	.9
12	12/12/77	1	5.2	11.1	2.1
13	12/13/77	1	1.3	4.1	3.3
14	12/14/77	1	4.0	10.4	2.6
15	12/15/77	1	10.7	8.2	.8
16	12/16/77	1	6.0	8.2	1.4
17	12/19/77	1	10.8	9.6	.9
18	12/20/77	1	4.1	8.8	2.1
19	12/21/77	1	10.2	10.4	1.0
20	12/22/77	1	13.7	12.6	.9
21	11/25/77	2	8.8	9.0	1.0
22	11/28/77	2	9.8	4.0	.4
23	11/29/77	2	8.3	4.5	.5
24	11/30/77	2	10.7	6.0	.6
25	12/01/77	2	.0	1.5	.0
26	12/02/77	2	10.5	6.6	.6
27	12/05/77	2	9.9	5.5	.6
28	12/06/77	2	6.2	2.6	.4
29	12/07/77	2	6.4	4.3	.7
30	12/08/77	2	7.6	.0	.0
31	12/09/77	2	9.7	.0	.0
32	12/12/77	2	5.2	3.6	.7
33	12/13/77	2	1.3	1.2	1.0
34	12/14/77	2	4.0	.0	.0
35	12/15/77	2	10.7	4.1	.4
36	12/16/77	2	6.0	3.5	.6
37	12/19/77	2	10.8	5.1	.5
38	12/20/77	2	4.1	2.7	.7
39	12/21/77	2	10.2	5.6	.6
40	12/22/77	2	13.7	7.7	.6
41	11/25/77	3	8.8	4.8	.5
42	11/28/77	3	9.8	.0	.0
43	11/29/77	3	8.3	2.5	.3
44	11/30/77	3	10.7	1.7	.2
45	12/01/77	3	.0	1.5	.0
46	12/02/77	3	10.5	4.2	.4
47	12/05/77	3	9.9	2.6	.3
48	12/06/77	3	6.2	2.4	.4
49	12/07/77	3	6.4	1.4	.2
50	12/08/77	3	7.6	1.8	.2
51	12/09/77	3	9.7	3.5	.4
52	12/12/77	3	5.2	1.2	.2
53	12/13/77	3	1.3	.7	.5
54	12/14/77	3	4.0	1.3	.3
55	12/15/77	3	10.7	1.7	.2
56	12/16/77	3	6.0	1.2	.2
57	12/19/77	3	10.8	2.2	.2
58	12/20/77	3	4.1	1.5	.4
59	12/21/77	3	10.2	2.7	.3
60	12/22/77	3	13.7	4.0	.3
61	11/25/77	4	8.8	5.9	.7
62	11/28/77	4	9.8	4.2	.4
63	11/29/77	4	8.3	5.4	.6
64	11/30/77	4	10.7	5.1	.5
65	12/01/77	4	.0	5.1	.0
66	12/02/77	4	10.5	9.5	.9
67	12/05/77	4	9.9	5.8	.6
68	12/06/77	4	6.2	6.0	1.0
69	12/07/77	4	6.4	2.6	.4
70	12/08/77	4	7.6	3.3	.4
71	12/09/77	4	9.7	5.1	.5
72	12/12/77	4	5.2	6.9	1.3
73	12/13/77	4	1.3	2.4	1.9
74	12/14/77	4	4.0	5.7	1.4
75	12/15/77	4	10.7	2.7	.3
76	12/16/77	4	6.0	5.0	.8
77	12/19/77	4	10.8	3.1	.3
78	12/20/77	4	4.1	4.5	1.1
79	12/21/77	4	10.2	4.6	.4
80	12/22/77	4	13.7	4.6	.3
81	11/25/77	5	8.8	10.7	1.2
82	11/28/77	5	9.8	7.0	.7
83	11/29/77	5	8.3	6.7	.8
84	11/30/77	5	10.7	6.4	.6
85	12/01/77	5	.0	4.5	.0
86	12/02/77	5	10.5	13.5	1.3
87	12/05/77	5	9.9	7.7	.8
88	12/06/77	5	6.2	8.1	1.3
89	12/07/77	5	6.4	3.6	.6
90	12/08/77	5	7.6	5.7	.7
91	12/09/77	5	9.7	5.0	.5
92	12/12/77	5	5.2	7.0	1.3
93	12/13/77	5	1.3	1.5	1.2
94	12/14/77	5	4.0	2.7	.7
95	12/15/77	5	10.7	6.6	.6
96	12/16/77	5	6.0	5.4	.9
97	12/19/77	5	10.8	7.6	.7
98	12/20/77	5	4.1	4.1	1.0
99	12/21/77	5	10.2	6.4	.6
100	12/22/77	5	13.7	11.8	.9
101	11/25/77	6	8.8	8.6	1.0
102	11/28/77	6	9.8	3.1	.3
103	11/29/77	6	8.3	5.3	.6
104	11/30/77	6	10.7	5.1	.5
105	12/01/77	6	.0	.0	.0
106	12/02/77	6	10.5	10.5	1.0
107	12/05/77	6	9.9	5.4	.5
108	12/06/77	6	6.2	9.4	1.5
109	12/07/77	6	6.4	1.8	.3
110	12/08/77	6	7.6	3.3	.4
111	12/09/77	6	9.7	4.9	.5
112	12/12/77	6	5.2	.0	.0
113	12/13/77	6	1.3	4.1	3.3
114	12/14/77	6	4.0	6.5	1.6
115	12/15/77	6	10.7	2.5	.2
116	12/16/77	6	6.0	5.4	.9
117	12/19/77	6	10.8	2.7	.3
118	12/20/77	6	4.1	6.2	1.5
119	12/21/77	6	10.2	4.4	.4
120	12/22/77	6	13.7	4.4	.3

NOTE: Zeroes indicate no valid data & were omitte from calculations.

1/ AVS - Eight-hou average (10 AM - 6 PM at the permanent monitor, 115 1/2 Ninth St.

2/ AVC - Eight-hou average at the study site.

TABLE D-2 contd.

Record No.	Date	Site	AVS 1/	AVC 2/	Ratio AVC/AVS
121	11/25/77	7	8.8	.0	.0
122	11/28/77	7	9.8	.0	.0
123	11/29/77	7	8.3	.0	.0
124	11/30/77	7	10.7	8.4	.8
125	12/01/77	7	.0	5.0	.0
126	12/02/77	7	10.5	.0	.0
127	12/05/77	7	9.9	7.0	.7
128	12/06/77	7	6.2	7.8	1.3
129	12/07/77	7	6.4	4.4	.7
130	12/08/77	7	7.6	.0	.0
131	12/09/77	7	9.7	7.8	.8
132	12/12/77	7	5.2	8.1	1.6
133	12/13/77	7	1.3	2.8	2.2
134	12/14/77	7	4.0	6.1	1.5
135	12/15/77	7	10.7	5.8	.5
136	12/16/77	7	6.0	7.0	1.2
137	12/19/77	7	10.8	7.0	.6
138	12/20/77	7	4.1	.0	.0
139	12/21/77	7	10.2	.0	.0
140	12/22/77	7	13.7	.0	.0
141	11/25/77	8	8.8	13.0	1.5
142	11/28/77	8	9.8	6.5	.7
143	11/29/77	8	8.3	8.0	1.0
144	11/30/77	8	10.7	.0	.0
145	12/01/77	8	.0	5.6	.0
146	12/02/77	8	10.5	.0	.0
147	12/05/77	8	9.9	.0	.0
148	12/06/77	8	6.2	.0	.0
149	12/07/77	8	6.4	4.5	.7
150	12/08/77	8	7.6	5.0	.7
151	12/09/77	8	9.7	4.1	.4
152	12/12/77	8	5.2	8.1	1.6
153	12/13/77	8	1.3	.0	.0
154	12/14/77	8	4.0	.0	.0
155	12/15/77	8	10.7	5.0	.5
156	12/16/77	8	6.0	7.1	1.2
157	12/19/77	8	10.8	.0	.0
158	12/20/77	8	4.1	.0	.0
159	12/21/77	8	10.2	8.8	.9
160	12/22/77	8	13.7	9.0	.7
161	11/25/77	9	8.8	.0	.0
162	11/28/77	9	9.8	7.5	.8
163	11/29/77	9	8.3	9.1	1.1
164	11/30/77	9	10.7	8.5	.8
165	12/01/77	9	.0	9.3	.0
166	12/02/77	9	10.5	13.6	1.3
167	12/05/77	9	9.9	7.8	.8
168	12/06/77	9	6.2	11.9	1.9
169	12/07/77	9	6.4	.0	.0
170	12/08/77	9	7.6	6.2	.8
171	12/09/77	9	9.7	7.9	.8
172	12/12/77	9	5.2	10.9	2.1
173	12/13/77	9	1.3	.0	.0
174	12/14/77	9	4.0	9.1	2.3
175	12/15/77	9	10.7	6.2	.6
176	12/16/77	9	6.0	5.3	.9
177	12/19/77	9	10.8	6.2	.6
178	12/20/77	9	4.1	8.4	2.0
179	12/21/77	9	10.2	7.2	.7
180	12/22/77	9	13.7	8.1	.6
181	11/25/77	11	8.8	9.1	1.0
182	11/28/77	11	9.8	4.6	.5
183	11/29/77	11	8.3	6.8	.8
184	11/30/77	11	10.7	4.5	.4
185	12/01/77	11	.0	12.9	.0
186	12/02/77	11	10.5	15.6	1.5
187	12/05/77	11	9.9	.0	.0
188	12/06/77	11	6.2	13.3	2.2
189	12/07/77	11	6.4	2.0	.3
190	12/08/77	11	7.6	4.1	.5
191	12/09/77	11	9.7	.0	.0
192	12/12/77	11	5.2	9.9	1.9
193	12/13/77	11	1.3	9.8	7.8
194	12/14/77	11	4.0	11.9	3.0
195	12/15/77	11	10.7	3.7	.3
196	12/16/77	11	6.0	7.2	1.2
197	12/19/77	11	10.8	4.4	.4
198	12/20/77	11	4.1	10.1	2.4
199	12/21/77	11	10.2	7.0	.7
200	12/22/77	11	13.7	6.2	.5
201	11/25/77	12	8.8	8.6	1.0
202	11/28/77	12	9.8	.0	.0
203	11/29/77	12	8.3	.0	.0
204	11/30/77	12	10.7	.0	.0
205	12/01/77	12	.0	4.0	.0
206	12/02/77	12	10.5	9.5	.9
207	12/05/77	12	9.9	5.5	.6
208	12/06/77	12	6.2	6.5	1.1
209	12/07/77	12	6.4	3.8	.6
210	12/08/77	12	7.6	5.0	.7
211	12/09/77	12	9.7	5.3	.5
212	12/12/77	12	5.2	6.0	1.2
213	12/13/77	12	1.3	2.7	2.1
214	12/14/77	12	4.0	4.6	1.2
215	12/15/77	12	10.7	3.9	.4
216	12/16/77	12	6.0	3.1	.5
217	12/19/77	12	10.8	4.7	.4
218	12/20/77	12	4.1	4.0	1.0
219	12/21/77	12	10.2	5.2	.5
220	12/22/77	12	13.7	5.9	.4
221	11/25/77	13	8.8	.0	.0
222	11/28/77	13	9.8	10.7	1.1
223	11/29/77	13	8.3	10.4	1.2
224	11/30/77	13	10.7	10.8	1.0
225	12/01/77	13	.0	4.1	.0
226	12/02/77	13	10.5	11.5	1.1
227	12/05/77	13	9.9	.0	.0
228	12/06/77	13	6.2	7.2	1.2
229	12/07/77	13	6.4	6.5	1.0
230	12/08/77	13	7.6	9.4	1.2
231	12/09/77	13	9.7	11.1	1.1
232	12/12/77	13	5.2	6.3	1.2
233	12/13/77	13	1.3	2.7	2.2
234	12/14/77	13	4.0	3.9	1.0
235	12/15/77	13	10.7	9.8	.9
236	12/16/77	13	6.0	6.6	1.1
237	12/19/77	13	10.8	12.4	1.1
238	12/20/77	13	4.1	4.1	1.0
239	12/21/77	13	10.2	10.2	1.0
240	12/22/77	13	13.7	14.2	1.0

NOTE: Zeroes indicat no valid data & were omitted from calculations.

1/ AVS - Eight-hour average (10 AM - 6 F at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average at the study site.

TABLE D-2 contd.

Record No.	Date	Site	AVS1/	AVC2/	Ratio AVC/AVS
241	11/25/77	14	8.8	11.2	1.3
242	11/28/77	14	9.8	3.6	.4
243	11/29/77	14	8.3	7.1	.9
244	11/30/77	14	10.7	7.1	.7
245	12/01/77	14	.0	6.6	.0
246	12/02/77	14	10.5	7.9	.7
247	12/05/77	14	9.9	7.4	.7
248	12/06/77	14	6.2	7.1	1.1
249	12/07/77	14	6.4	4.7	.7
250	12/08/77	14	7.6	4.9	.6
251	12/09/77	14	9.7	7.1	.7
252	12/12/77	14	5.2	6.3	1.2
253	12/13/77	14	1.3	2.4	1.9
254	12/14/77	14	4.0	4.6	1.1
255	12/15/77	14	10.7	5.1	.5
256	12/16/77	14	6.0	6.1	1.0
257	12/19/77	14	10.8	6.7	.6
258	12/20/77	14	4.1	.0	.0
259	12/21/77	14	10.2	7.8	.8
260	12/22/77	14	13.7	.0	.0
261	11/25/77	15	8.8	.0	.0
262	11/28/77	15	9.8	.0	.0
263	11/29/77	15	8.3	.0	.0
264	11/30/77	15	10.7	7.5	.7
265	12/01/77	15	.0	4.1	.0
266	12/02/77	15	10.5	.0	.0
267	12/05/77	15	9.9	6.2	.6
268	12/06/77	15	6.2	4.1	.7
269	12/07/77	15	6.4	1.8	.3
270	12/08/77	15	7.6	3.1	.4
271	12/09/77	15	9.7	6.2	.6
272	12/12/77	15	5.2	5.9	1.1
273	12/13/77	15	1.3	1.1	.8
274	12/14/77	15	4.0	2.4	.6
275	12/15/77	15	10.7	3.2	.3
276	12/16/77	15	6.0	3.1	.5
277	12/19/77	15	10.8	5.1	.5
278	12/20/77	15	4.1	3.6	.9
279	12/21/77	15	10.2	5.6	.6
280	12/22/77	15	13.7	7.6	.6
281	11/25/77	16	8.8	8.5	1.0
282	11/28/77	16	9.8	5.8	.6
283	11/29/77	16	8.3	.0	.0
284	11/30/77	16	10.7	5.9	.5
285	12/01/77	16	.0	4.2	.0
286	12/02/77	16	10.5	9.9	.9
287	12/05/77	16	9.9	7.6	.8
288	12/06/77	16	6.2	6.1	1.0
289	12/07/77	16	6.4	3.7	.6
290	12/08/77	16	7.6	6.4	.8
291	12/09/77	16	9.7	4.9	.5
292	12/12/77	16	5.2	5.7	1.1
293	12/13/77	16	1.3	1.3	1.0
294	12/14/77	16	4.0	2.4	.6
295	12/15/77	16	10.7	7.0	.6
296	12/16/77	16	6.0	3.0	.5
297	12/19/77	16	10.8	8.9	.8
298	12/20/77	16	4.1	2.7	.7
299	12/21/77	16	10.2	5.6	.5
300	12/22/77	16	13.7	9.4	.7
301	11/25/77	17	8.8	13.6	1.5
302	11/28/77	17	9.8	4.7	.5
303	11/29/77	17	8.3	.0	.0
304	11/30/77	17	10.7	4.0	.4
305	12/01/77	17	.0	8.3	.0
306	12/02/77	17	10.5	15.2	1.5
307	12/05/77	17	9.9	.0	.0
308	12/06/77	17	6.2	10.2	1.6
309	12/07/77	17	6.4	.0	.0
310	12/08/77	17	7.6	4.7	.6
311	12/09/77	17	9.7	6.3	.6
312	12/12/77	17	5.2	5.7	1.1
313	12/13/77	17	1.3	3.2	2.6
314	12/14/77	17	4.0	6.7	1.7
315	12/15/77	17	10.7	5.1	.5
316	12/16/77	17	6.0	5.5	.9
317	12/19/77	17	10.8	.0	.0
318	12/20/77	17	4.1	5.9	1.4
319	12/21/77	17	10.2	4.5	.4
320	12/22/77	17	13.7	7.7	.6
321	11/25/77	18	8.8	12.1	1.4
322	11/28/77	18	9.8	7.4	.8
323	11/29/77	18	8.3	7.8	.9
324	11/30/77	18	10.7	8.5	.8
325	12/01/77	18	.0	10.8	.0
326	12/02/77	18	10.5	15.3	1.5
327	12/05/77	18	9.9	.0	.0
328	12/06/77	18	6.2	10.4	1.7
329	12/07/77	18	6.4	6.4	1.0
330	12/08/77	18	7.6	5.6	.7
331	12/09/77	18	9.7	5.8	.6
332	12/12/77	18	5.2	9.3	1.8
333	12/13/77	18	1.3	5.7	4.5
334	12/14/77	18	4.0	9.4	2.3
335	12/15/77	18	10.7	5.1	.5
336	12/16/77	18	6.0	8.5	1.4
337	12/19/77	18	10.8	7.5	.7
338	12/20/77	18	4.1	7.0	1.7
339	12/21/77	18	10.2	8.1	.8
340	12/22/77	18	13.7	11.2	.8
341	11/25/77	19	8.8	10.2	1.2
342	11/28/77	19	9.8	9.5	1.0
343	11/29/77	19	8.3	7.4	.9
344	11/30/77	19	10.7	9.2	.9
345	12/01/77	19	.0	5.9	.0
346	12/02/77	19	10.5	12.1	1.2
347	12/05/77	19	9.9	6.7	.7
348	12/06/77	19	6.2	8.0	1.3
349	12/07/77	19	6.4	6.2	1.0
350	12/08/77	19	7.6	4.7	.6
351	12/09/77	19	9.7	7.6	.8
352	12/12/77	19	5.2	6.0	1.2
353	12/13/77	19	1.3	2.9	2.3
354	12/14/77	19	4.0	6.1	1.5
355	12/15/77	19	10.7	6.3	.6
356	12/16/77	19	6.0	6.0	1.0
357	12/19/77	19	10.8	6.8	.6
358	12/20/77	19	4.1	3.0	.7
359	12/21/77	19	10.2	7.3	.7
360	12/22/77	19	13.7	9.9	.7

NOTE: Zeroes indicate no valid data & were omitted from calculations.

1/ AVS - Eight-hour average (10 AM-6 PM) at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average at the study site.

TABLE D-2 contd.

Record No.	Date	Site	AVS[1]	AVC[2]	Ratio AVC/AVS
361	11/25/77	20	8.8	11.3	1.3
362	11/28/77	20	9.8	.0	.0
363	11/29/77	20	8.3	7.8	.9
364	11/30/77	20	10.7	8.2	.8
365	12/01/77	20	.0	11.0	.0
366	12/02/77	20	10.5	13.8	1.3
367	12/05/77	20	9.9	8.6	.9
368	12/06/77	20	6.2	11.5	1.9
369	12/07/77	20	6.4	3.0	.5
370	12/08/77	20	7.6	5.2	.7
371	12/09/77	20	9.7	6.9	.7
372	12/12/77	20	5.2	9.0	1.7
373	12/13/77	20	1.3	3.8	3.0
374	12/14/77	20	4.0	9.1	2.3
375	12/15/77	20	10.7	5.6	.5
376	12/16/77	20	6.0	4.7	.8
377	12/19/77	20	10.8	7.4	.7
378	12/20/77	20	4.1	10.1	2.4
379	12/21/77	20	10.2	7.3	.7
380	12/22/77	20	13.7	9.6	.7
381	11/25/77	21	8.8	8.1	.9
382	11/28/77	21	9.8	3.3	.3
383	11/29/77	21	8.3	4.1	.5
384	11/30/77	21	10.7	3.7	.3
385	12/01/77	21	.0	8.4	.0
386	12/02/77	21	10.5	9.9	.9
387	12/05/77	21	9.9	5.6	.6
388	12/06/77	21	6.2	8.0	1.3
389	12/07/77	21	6.4	2.0	.3
390	12/08/77	21	7.6	3.2	.4
391	12/09/77	21	9.7	3.7	.4
392	12/12/77	21	5.2	6.0	1.2
393	12/13/77	21	1.3	4.3	3.4
394	12/14/77	21	4.0	7.2	1.8
395	12/15/77	21	10.7	3.2	.3
396	12/16/77	21	6.0	3.0	.5
397	12/19/77	21	10.8	2.9	.3
398	12/20/77	21	4.1	4.1	1.0
399	12/21/77	21	10.2	4.0	.4
400	12/22/77	21	13.7	4.6	.3
401	11/25/77	22	8.8	9.1	1.0
402	11/28/77	22	9.8	4.6	.5
403	11/29/77	22	8.3	6.9	.8
404	11/30/77	22	10.7	5.3	.5
405	12/01/77	22	.0	5.8	.0
406	12/02/77	22	10.5	11.1	1.1
407	12/05/77	22	9.9	5.6	.6
408	12/06/77	22	6.2	7.6	1.2
409	12/07/77	22	6.4	2.1	.3
410	12/08/77	22	7.6	4.0	.5
411	12/09/77	22	9.7	6.2	.6
412	12/12/77	22	5.2	7.1	1.4
413	12/13/77	22	1.3	2.9	2.3
414	12/14/77	22	4.0	6.0	1.5
415	12/15/77	22	10.7	5.1	.5
416	12/16/77	22	6.0	4.0	.7
417	12/19/77	22	10.8	4.1	.4
418	12/20/77	22	4.1	3.9	.9
419	12/21/77	22	10.2	5.4	.5
420	12/22/77	22	13.7	8.4	.6
421	11/25/77	23	8.8	9.4	1.1

Record No.	Date	Site	AVS[1]	AVC[2]	Ratio AVC/AVS
422	11/28/77	23	9.8	.0	.0
423	11/29/77	23	8.3	5.8	.7
424	11/30/77	23	10.7	.0	.0
425	12/01/77	23	.0	13.0	.0
426	12/02/77	23	10.5	11.6	1.1
427	12/05/77	23	9.9	.0	.0
428	12/06/77	23	6.2	8.9	1.4
429	12/07/77	23	6.4	4.1	.6
430	12/08/77	23	7.6	4.2	.6
431	12/09/77	23	9.7	6.0	.6
432	12/12/77	23	5.2	7.8	1.5
433	12/13/77	23	1.3	4.4	3.5
434	12/14/77	23	4.0	7.5	1.9
435	12/15/77	23	10.7	3.5	.3
436	12/16/77	23	6.0	5.2	.9
437	12/19/77	23	10.8	7.1	.7
438	12/20/77	23	4.1	5.7	1.4
439	12/21/77	23	10.2	5.8	.6
440	12/22/77	23	13.7	7.3	.5
441	11/25/77	24	8.8	6.8	.8
442	11/28/77	24	9.8	3.6	.4
443	11/29/77	24	8.3	3.8	.5
444	11/30/77	24	10.7	3.3	.3
445	12/01/77	24	.0	7.6	.0
446	12/02/77	24	10.5	15.1	1.4
447	12/05/77	24	9.9	4.6	.5
448	12/06/77	24	6.2	9.1	1.5
449	12/07/77	24	6.4	1.1	.2
450	12/08/77	24	7.6	2.6	.3
451	12/09/77	24	9.7	3.5	.4
452	12/12/77	24	5.2	6.4	1.2
453	12/13/77	24	1.3	3.2	2.6
454	12/14/77	24	4.0	7.6	1.9
455	12/15/77	24	10.7	2.8	.3
456	12/16/77	24	6.0	4.5	.7
457	12/19/77	24	10.8	2.5	.2
458	12/20/77	24	4.1	6.0	1.5
459	12/21/77	24	10.2	4.1	.4
460	12/22/77	24	13.7	5.1	.4
461	11/25/77	25	8.8	9.0	1.0
462	11/28/77	25	9.8	5.4	.5
463	11/29/77	25	8.3	7.1	.8
464	11/30/77	25	10.7	5.9	.6
465	12/01/77	25	.0	9.0	.0
466	12/02/77	25	10.5	13.4	1.3
467	12/05/77	25	9.9	7.0	.7
468	12/06/77	25	6.2	11.0	1.8
469	12/07/77	25	6.4	3.8	.6
470	12/08/77	25	7.6	4.9	.6
471	12/09/77	25	9.7	6.1	.6
472	12/12/77	25	5.2	6.4	1.2
473	12/13/77	25	1.3	3.1	2.5
474	12/14/77	25	4.0	.0	.0
475	12/15/77	25	10.7	6.0	.6
476	12/16/77	25	6.0	4.2	.7
477	12/19/77	25	10.8	7.7	.7
478	12/20/77	25	4.1	5.7	1.4
479	12/21/77	25	10.2	7.1	.7
480	12/22/77	25	13.7	9.0	.7

NOTE: Zeroes indica no valid data & wer omitted from calculations.

1/ AVS - Eight-hour average (10 AM-6 PM at the permanent mc itor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average at the stud site.

TABLE D-2 contd.

Record No.	Date	Site	AVS[1/]	AVC[2/]	Ratio AVC/AVS
481	11/25/77	26	8.8	8.6	1.0
482	11/28/77	26	9.8	6.3	.6
483	11/29/77	26	8.3	6.3	.8
484	11/30/77	26	10.7	6.1	.5
485	12/01/77	26	.0	5.5	.0
486	12/02/77	26	10.5	10.6	1.0
487	12/05/77	26	9.9	4.6	.5
488	12/06/77	26	6.2	5.0	.8
489	12/07/77	26	6.4	2.6	.4
490	12/08/77	26	7.6	3.5	.5
491	12/09/77	26	9.7	4.0	.4
492	12/12/77	26	5.2	4.7	.9
493	12/13/77	26	1.3	2.5	2.0
494	12/14/77	26	4.0	8.4	2.1
495	12/15/77	26	10.7	4.4	.4
496	12/16/77	26	6.0	3.4	.6
497	12/19/77	26	10.8	4.6	.4
498	12/20/77	26	4.1	4.2	1.0
499	12/21/77	26	10.2	4.5	.4
500	12/22/77	26	13.7	6.2	.5
501	11/25/77	32	8.8	16.2	1.8
502	11/28/77	32	9.8	11.3	1.2
503	11/29/77	32	8.3	10.3	1.2
504	11/30/77	32	10.7	10.1	.9
505	12/01/77	32	.0	6.4	.0
506	12/02/77	32	10.5	16.5	1.6
507	12/05/77	32	9.9	12.1	1.2
508	12/06/77	32	6.2	11.1	1.8
509	12/07/77	32	6.4	8.7	1.4
510	12/08/77	32	7.6	8.7	1.1
511	12/09/77	32	9.7	12.1	1.2
512	12/12/77	32	5.2	9.7	1.9
513	12/13/77	32	1.3	4.0	3.2
514	12/14/77	32	4.0	8.3	2.1
515	12/15/77	32	10.7	9.9	.9
516	12/16/77	32	6.0	11.0	1.8
517	12/19/77	32	10.8	12.3	1.1
518	12/20/77	32	4.1	7.4	1.8
519	12/21/77	32	10.2	12.6	1.2
520	12/22/77	32	13.7	17.2	1.3
521	11/25/77	10A	8.8	11.6	1.3
522	11/28/77	10A	9.8	7.7	.8
523	11/29/77	10A	8.3	9.6	1.2
524	11/30/77	10A	10.7	8.0	.7
525	12/01/77	10A	.0	7.9	.0
526	12/02/77	10A	10.5	15.9	1.5
527	12/05/77	10A	9.9	13.2	1.3
528	12/06/77	10A	6.2	13.0	2.1
529	12/07/77	10A	6.4	4.6	.7
530	12/08/77	10A	7.6	8.0	1.1
531	11/25/77	27A	8.8	5.6	.6
532	11/28/77	27A	9.8	4.2	.4
533	11/29/77	27A	8.3	4.5	.5
534	11/30/77	27A	10.7	2.9	.3
535	12/01/77	27A	.0	5.4	.0
536	12/02/77	27A	10.5	10.1	1.0
537	12/05/77	27A	9.9	2.6	.3
538	12/06/77	27A	6.2	7.2	1.2
539	12/07/77	27A	6.4	1.1	.2
540	12/08/77	27A	7.6	1.8	.2
541	12/09/77	27B	9.7	3.6	.4

Record No.	Date	Site	AVS[1/]	AVC[2/]	Ratio AVC/AVS
542	12/12/77	27B	5.2	3.8	.7
543	12/13/77	27B	1.3	1.2	1.0
544	12/14/77	27B	4.0	3.5	.9
545	12/15/77	27B	10.7	2.9	.3
546	12/16/77	27B	6.0	1.7	.3
547	12/19/77	27B	10.8	2.7	.2
548	12/20/77	27B	4.1	2.7	.6
549	12/21/77	27B	10.2	4.1	.4
550	12/22/77	27B	13.7	5.3	.4
551	11/25/77	28A	8.8	.0	.0
552	11/28/77	28A	9.8	7.0	.7
553	11/29/77	28A	8.3	8.0	1.0
554	11/30/77	28A	10.7	7.8	.7
555	12/01/77	28A	.0	5.9	.0
556	12/02/77	28A	10.5	8.0	.8
557	12/05/77	28A	9.9	5.2	.5
558	12/06/77	28A	6.2	7.6	1.2
559	12/07/77	28A	6.4	2.5	.4
560	12/08/77	28A	7.6	3.1	.4
561	12/09/77	28B	9.7	4.2	.4
562	12/12/77	28B	5.2	5.0	1.0
563	12/13/77	28B	1.3	.0	.0
564	12/14/77	28B	4.0	6.4	1.6
565	12/15/77	28B	10.7	3.7	.3
566	12/16/77	28B	6.0	3.0	.5
567	12/19/77	28B	10.8	3.5	.3
568	12/20/77	28B	4.1	6.1	1.5
569	12/21/77	28B	10.2	5.1	.5
570	12/22/77	28B	13.7	7.8	.6
571	11/25/77	29A	8.8	6.4	.7
572	11/28/77	29A	9.8	4.9	.5
573	11/29/77	29A	8.3	5.2	.6
574	11/30/77	29A	10.7	5.9	.6
575	12/01/77	29A	.0	5.4	.0
576	12/02/77	29A	10.5	9.5	.9
577	12/05/77	29A	9.9	3.8	.4
578	12/06/77	29A	6.2	8.5	1.4
579	12/07/77	29A	6.4	2.2	.3
580	12/08/77	29A	7.6	3.7	.5
581	12/09/77	29B	9.7	4.4	.4
582	12/12/77	29B	5.2	5.4	1.0
583	12/13/77	29B	1.3	2.5	2.0
584	12/14/77	29B	4.0	4.7	1.2
585	12/15/77	29B	10.7	2.5	.2
586	12/16/77	29B	6.0	3.3	.5
587	12/19/77	29B	10.8	3.5	.3
588	12/20/77	29B	4.1	4.7	1.1
589	12/21/77	29B	10.2	3.7	.4
590	12/22/77	29B	13.7	4.9	.4
591	11/25/77	30A	8.8	11.0	1.2
592	11/28/77	30A	9.8	9.7	1.0
593	11/29/77	30A	8.3	8.3	1.0
594	11/30/77	30A	10.7	6.4	.6
595	12/01/77	30A	.0	6.6	.0
596	12/02/77	30A	10.5	11.4	1.1
597	12/05/77	30A	9.9	9.0	.9
598	12/06/77	30A	6.2	7.0	1.1
599	12/07/77	30A	6.4	3.6	.6
600	12/08/77	30A	7.6	7.8	1.0

NOTE: Zeroes indicat no valid data & were omitted from calculations.

1/ AVS - Eight-hour average (10 AM-6 PM) at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average at the study site.

TABLE D-2 contd.

Record No.	Date	Site	AVS1/	AVC2/	Ratio AVC/AVS
601	12/09/77	30B	9.7	4.0	.4
602	12/12/77	30B	5.2	4.6	.9
603	12/13/77	30B	1.3	2.4	1.9
604	12/14/77	30B	4.0	6.0	1.5
605	12/15/77	30B	10.7	2.1	.2
606	12/16/77	30B	6.0	4.0	.7
607	12/19/77	30B	10.8	2.2	.2
608	12/20/77	30B	4.1	2.4	.6
609	12/21/77	30B	10.2	3.2	.3
610	12/22/77	30B	13.7	4.4	.3
611	11/25/77	31A	8.8	.0	.0
612	11/28/77	31A	9.8	8.7	.9
613	11/29/77	31A	8.3	7.5	.9
614	11/30/77	31A	10.7	7.5	.7
615	12/01/77	31A	.0	5.0	.0
616	12/02/77	31A	10.5	7.7	.7
617	12/05/77	31A	9.9	6.7	.7
618	12/06/77	31A	6.2	6.3	1.0
619	12/07/77	31A	6.4	.0	.0
620	12/08/77	31A	7.6	4.9	.6
621	12/09/77	31B	9.7	.0	.0
622	12/12/77	31B	5.2	5.7	1.1
623	12/13/77	31B	1.3	2.1	1.7
624	12/14/77	31B	4.0	4.9	1.2
625	12/15/77	31B	10.7	4.4	.4
626	12/16/77	31B	6.0	4.1	.7
627	12/19/77	31B	10.8	4.7	.4
628	12/20/77	31B	4.1	.0	.0
629	12/21/77	31B	10.2	4.3	.4
630	12/22/77	31B	13.7	6.3	.5
631	12/09/77	32B	9.7	.0	.0
632	12/12/77	32B	5.2	9.7	1.9
633	12/13/77	32B	1.3	4.6	3.7
634	12/14/77	32B	4.0	.0	.0
635	12/15/77	32B	10.7	.0	.0
636	12/16/77	32B	6.0	4.6	.8
637	12/19/77	32B	10.8	7.0	.6
638	12/20/77	32B	4.1	3.0	.7
639	12/21/77	32B	10.2	7.3	.7
640	12/22/77	32B	13.7	8.1	.6
641	11/25/77	33A	8.8	.0	.0
642	11/28/77	33A	9.8	.0	.0
643	11/29/77	33A	8.3	9.5	1.1
644	11/30/77	33A	10.7	11.6	1.1
645	12/01/77	33A	.0	4.1	.0
646	12/02/77	33A	10.5	.0	.0
647	12/05/77	33A	9.9	10.6	1.1
648	12/06/77	33A	6.2	.0	.0
649	12/07/77	33A	6.4	6.8	1.1
650	12/08/77	33A	7.6	8.6	1.1
651	12/09/77	33B	9.7	5.6	.6
652	12/12/77	33B	5.2	5.4	1.0
653	12/13/77	33B	1.3	4.5	3.6
654	12/14/77	33B	4.0	8.4	2.1
655	12/15/77	33B	10.7	3.0	.3
656	12/16/77	33B	6.0	6.5	1.1
657	12/19/77	33B	10.8	6.1	.6
658	12/20/77	33B	4.1	7.2	1.7
659	12/21/77	33B	10.2	6.2	.6
660	12/22/77	33B	13.7	6.5	.5

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AVS - Eight-hour average (10 AM - 6 PM) at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average at the study site.

TABLE D-3. Ratios of Eight-Hour Averages (EPA Study Sites and the Permanent Monitor) Sorted by the Average for the Permanent Monitor (CO in ppm)

Record No.	Date	Site	AVS1/	AVC2/	Ratio AVC/AVS
1	12/22/77	32	13.7	17.2	1.3
2	12/22/77	13	13.7	14.2	1.0
3	12/22/77	1	13.7	12.6	.9
4	12/22/77	5	13.7	11.8	.9
5	12/22/77	18	13.7	11.2	.8
6	12/22/77	19	13.7	9.9	.7
7	12/22/77	20	13.7	9.6	.7
8	12/22/77	16	13.7	9.4	.7
9	12/22/77	25	13.7	9.0	.7
10	12/22/77	8	13.7	9.0	.7
11	12/22/77	22	13.7	8.4	.6
12	12/22/77	9	13.7	8.1	.6
13	12/22/77	32B	13.7	8.1	.6
14	12/22/77	28B	13.7.	7.8	.6
15	12/22/77	2	13.7	7.7	.6
16	12/22/77	17	13.7	7.7	.6
17	12/22/77	15	13.7	7.6	.6
18	12/22/77	23	13.7	7.3	.5
19	12/22/77	33B	13.7	6.5	.5
20	12/22/77	31B	13.7	6.3	.5
21	12/22/77	26	13.7	6.2	.5
22	12/22/77	11	13.7	6.2	.5
23	12/22/77	12	13.7	5.9	.4
24	12/22/77	27B	13.7	5.3	.4
25	12/22/77	24	13.7	5.1	.4
26	12/22/77	29B	13.7	4.9	.4
27	12/22/77	21	13.7	4.6	.3
28	12/22/77	4	13.7	4.6	.3
29	12/22/77	6	13.7	4.4	.3
30	12/22/77	30B	13.7	4.4	.3
31	12/22/77	3	13.7	4.0	.3
32	12/22/77	7	13.7	.0	.0
33	12/22/77	14	13.7	.0	.0
34	12/19/77	13	10.8	12.4	1.1
35	12/19/77	32	10.8	12.3	1.1
36	12/19/77	1	10.8	9.6	.9
37	12/19/77	16	10.8	8.9	.8
38	12/19/77	25	10.8	7.7	.7
39	12/19/77	5	10.8	7.6	.7
40	12/19/77	18	10.8	7.5	.7
41	12/19/77	20	10.8	7.4	.7
42	12/19/77	23	10.8	7.1	.7
43	12/19/77	7	10.8	7.0	.6
44	12/19/77	32B	10.8	7.0	.6
45	12/19/77	19	10.8	6.8	.6
46	12/19/77	14	10.8	6.7	.6
47	12/19/77	9	10.8	6.2	.6
48	12/19/77	33B	10.8	6.1	.6
49	12/19/77	2	10.8	5.1	.5
50	12/19/77	15	10.8	5.1	.5
51	12/19/77	12	10.8	4.7	.4
52	12/19/77	31B	10.8	4.7	.4
53	12/19/77	26	10.8	4.6	.4
54	12/19/77	11	10.8	4.4	.4
55	12/19/77	22	10.8	4.1	.4
56	12/19/77	29B	10.8	3.5	.3
57	12/19/77	28B	10.8	3.5	.3
58	12/19/77	4	10.8	3.1	.3
59	12/19/77	21	10.8	2.9	.3
60	12/19/77	6	10.8	2.7	.3
61	12/19/77	27B	10.8	2.7	.2
62	12/19/77	24	10.8	2.5	.2
63	12/19/77	30B	10.8	2.2	.2
64	12/19/77	3	10.8	2.2	.2
65	12/19/77	8	10.8	.0	.0
66	12/19/77	17	10.8	.0	.0
67	12/15/77	32	10.7	9.9	.9
68	12/15/77	13	10.7	9.8	.9
69	12/15/77	1	10.7	8.2	.8
70	12/15/77	16	10.7	7.0	.6
71	12/15/77	5	10.7	6.6	.6
72	12/15/77	19	10.7	6.3	.6
73	12/15/77	9	10.7	6.2	.6
74	12/15/77	25	10.7	6.0	.6
75	12/15/77	7	10.7	5.8	.5
76	12/15/77	20	10.7	5.6	.5
77	12/15/77	17	10.7	5.1	.5
78	12/15/77	18	10.7	5.1	.5
79	12/15/77	22	10.7	5.1	.5
80	12/15/77	14	10.7	5.1	.5
81	12/15/77	8	10.7	5.0	.5
82	12/15/77	26	10.7	4.4	.4
83	12/15/77	31B	10.7	4.4	.4
84	12/15/77	2	10.7	4.1	.4
85	12/15/77	12	10.7	3.9	.4
86	12/15/77	11	10.7	3.7	.3
87	12/15/77	28B	10.7	3.7	.3
88	12/15/77	23	10.7	3.5	.3
89	12/15/77	15	10.7	3.2	.3
90	12/15/77	21	10.7	3.2	.3
91	12/15/77	33B	10.7	3.0	.3
92	12/15/77	27B	10.7	2.9	.3
93	12/15/77	24	10.7	2.8	.3
94	12/15/77	4	10.7	2.7	.3
95	12/15/77	29B	10.7	2.5	.2
96	12/15/77	6	10.7	2.5	.2
97	12/15/77	30B	10.7	2.1	.2
98	12/15/77	3	10.7	1.7	.2
99	12/15/77	32B	10.7	.0	.0
100	11/30/77	33A	10.7	11.6	1.1
101	11/30/77	13	10.7	10.8	1.0
102	11/30/77	32	10.7	10.1	.9
103	11/30/77	1	10.7	9.9	.9
104	11/30/77	19	10.7	9.2	.9
105	11/30/77	18	10.7	8.5	.8
106	11/30/77	9	10.7	8.5	.8
107	11/30/77	7	10.7	8.4	.8
108	11/30/77	20	10.7	8.2	.8
109	11/30/77	10A	10.7	8.0	.7
110	11/30/77	28A	10.7	7.8	.7
111	11/30/77	15	10.7	7.5	.7
112	11/30/77	31A	10.7	7.5	.7
113	11/30/77	14	10.7	7.1	.7
114	11/30/77	5	10.7	6.4	.6
115	11/30/77	30A	10.7	6.4	.6
116	11/30/77	2	10.7	6.0	.6
117	11/30/77	25	10.7	5.9	.8
118	11/30/77	29A	10.7	5.9	.6
119	11/30/77	16	10.7	5.9	.5
120	11/30/77	22	10.7	5.3	.5

120 RECORD(S)

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AVS - Eight-hour average (10 AM-6 PM) carbon monoxide at the permanent monitor 115 1/2 Ninth Street.

2/ AVC - Eight-hour average (10 AM-6 PM) at the study site.

TABLE D-3 contd.

Record No.	Date	Site	AVS 1/	AVC 2/	Ratio AVC/AVS
121	11/30/77	6	10.7	5.1	.5
122	11/30/77	26	10.7	5.1	.5
123	11/30/77	4	10.7	5.1	.5
124	11/30/77	11	10.7	4.5	.4
125	11/30/77	17	10.7	4.0	.4
126	11/30/77	21	10.7	3.7	.3
127	11/30/77	24	10.7	3.3	.3
128	11/30/77	27A	10.7	2.9	.3
129	11/30/77	3	10.7	1.7	.2
130	11/30/77	8	10.7	.0	.0
131	11/30/77	12	10.7	.0	.0
132	11/30/77	23	10.7	.0	.0
133	12/02/77	32	10.5	16.5	1.6
134	12/02/77	10A	10.5	15.9	1.5
135	12/02/77	11	10.5	15.6	1.5
136	12/02/77	18	10.5	15.3	1.5
137	12/02/77	17	10.5	15.2	1.5
138	12/02/77	24	10.5	15.1	1.4
139	12/02/77	1	10.5	14.7	1.4
140	12/02/77	20	10.5	13.8	1.3
141	12/02/77	9	10.5	13.6	1.3
142	12/02/77	5	10.5	13.5	1.3
143	12/02/77	25	10.5	13.4	1.3
144	12/02/77	19	10.5	12.1	1.2
145	12/02/77	23	10.5	11.6	1.1
146	12/02/77	13	10.5	11.5	1.1
147	12/02/77	30A	10.5	11.4	1.1
148	12/02/77	22	10.5	11.1	1.1
149	12/02/77	26	10.5	10.6	1.0
150	12/02/77	6	10.5	10.5	1.0
151	12/02/77	27A	10.5	10.1	1.0
152	12/02/77	16	10.5	9.9	.9
153	12/02/77	21	10.5	9.9	.9
154	12/02/77	4	10.5	9.5	.9
155	12/02/77	12	10.5	9.5	.9
156	12/02/77	29A	10.5	9.5	.9
157	12/02/77	28A	10.5	8.0	.8
158	12/02/77	14	10.5	7.9	.7
159	12/02/77	31A	10.5	7.7	.7
160	12/02/77	2	10.5	6.6	.6
161	12/02/77	3	10.5	4.2	.4
162	12/02/77	7	10.5	.0	.0
163	12/02/77	8	10.5	.0	.0
164	12/02/77	15	10.5	.0	.0
165	12/02/77	33A	10.5	.0	.0
166	12/21/77	32	10.2	12.6	1.2
167	12/21/77	1	10.2	10.4	1.0
168	12/21/77	13	10.2	10.2	1.0
169	12/21/77	8	10.2	8.8	.9
170	12/21/77	18	10.2	8.1	.8
171	12/21/77	14	10.2	7.8	.8
172	12/21/77	19	10.2	7.3	.7
173	12/21/77	20	10.2	7.3	.7
174	12/21/77	32B	10.2	7.3	.7
175	12/21/77	9	10.2	7.2	.7
176	12/21/77	25	10.2	7.1	.7
177	12/21/77	11	10.2	7.0	.7
178	12/21/77	5	10.2	6.4	.6
179	12/21/77	33B	10.2	6.2	.6
180	12/21/77	23	10.2	5.8	.6
181	12/21/77	2	10.2	5.6	.6
182	12/21/77	15	10.2	5.6	.6
183	12/21/77	16	10.2	5.6	.5
184	12/21/77	22	10.2	5.4	.5
185	12/21/77	12	10.2	5.2	.5
186	12/21/77	28B	10.2	5.1	.5
187	12/21/77	4	10.2	4.6	.4
188	12/21/77	17	10.2	4.5	.4
189	12/21/77	26	10.2	4.5	.4
190	12/21/77	6	10.2	4.4	.4
191	12/21/77	31B	10.2	4.3	.4
192	12/21/77	27B	10.2	4.1	.4
193	12/21/77	24	10.2	4.1	.4
194	12/21/77	21	10.2	4.0	.4
195	12/21/77	29B	10.2	3.7	.4
196	12/21/77	30B	10.2	3.2	.3
197	12/21/77	3	10.2	2.7	.3
198	12/21/77	7	10.2	.0	.0
199	12/05/77	10A	9.9	13.2	1.3
200	12/05/77	32	9.9	12.1	1.2
201	12/05/77	33A	9.9	10.6	1.1
202	12/05/77	1	9.9	10.2	1.0
203	12/05/77	30A	9.9	9.0	.9
204	12/05/77	20	9.9	8.6	.9
205	12/05/77	9	9.9	7.8	.8
206	12/05/77	5	9.9	7.7	.8
207	12/05/77	16	9.9	7.6	.8
208	12/05/77	14	9.9	7.4	.7
209	12/05/77	7	9.9	7.0	.7
210	12/05/77	25	9.9	7.0	.7
211	12/05/77	19	9.9	6.7	.7
212	12/05/77	31A	9.9	6.7	.7
213	12/05/77	15	9.9	6.2	.6
214	12/05/77	4	9.9	5.8	.6
215	12/05/77	22	9.9	5.6	.6
216	12/05/77	21	9.9	5.6	.6
217	12/05/77	12	9.9	5.5	.6
218	12/05/77	2	9.9	5.5	.6
219	12/05/77	6	9.9	5.4	.5
220	12/05/77	28A	9.9	5.2	.5
221	12/05/77	26	9.9	4.6	.5
222	12/05/77	24	9.9	4.6	.5
223	12/05/77	29A	9.9	3.8	.4
224	12/05/77	3	9.9	2.6	.3
225	12/05/77	27A	9.9	2.6	.3
226	12/05/77	8	9.9	.0	.0
227	12/05/77	11	9.9	.0	.0
228	12/05/77	13	9.9	.0	.0
229	12/05/77	17	9.9	.0	.0
230	12/05/77	18	9.9	.0	.0
231	12/05/77	23	9.9	.0	.0
232	11/28/77	32	9.8	11.3	1.2
233	11/28/77	13	9.8	10.7	1.1
234	11/28/77	1	9.8	10.1	1.0
235	11/28/77	30A	9.8	9.7	1.0
236	11/28/77	19	9.8	9.5	1.0
237	11/28/77	31A	9.8	8.7	.9
238	11/28/77	10A	9.8	7.7	.8
239	11/28/77	9	9.8	7.5	.8
240	11/28/77	18	9.8	7.4	.8

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AVS - Eight-hour average (10 AM-6 PM) carbon monoxide at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average (10 AM-6 PM) at the study site.

TABLE D-3 contd.

Record No.	Date	Site	AVS1/	AVC2/	Ratio AVC/AVS
241	11/28/77	5	9.8	7.0	.7
242	11/29/77	28A	9.8	7.0	.7
243	11/28/77	8	9.8	6.5	.7
244	11/28/77	26	9.8	6.3	.6
245	11/28/77	16	9.8	5.8	.6
246	11/28/77	25	9.8	5.4	.5
247	11/28/77	29A	9.8	4.9	.5
248	11/28/77	17	9.8	4.7	.5
249	11/28/77	22	9.8	4.6	.5
250	11/28/77	11	9.8	4.6	.5
251	11/28/77	4	9.8	4.2	.4
252	11/28/77	27A	9.8	4.2	.4
253	11/28/77	2	9.8	4.0	.4
254	11/28/77	14	9.8	3.6	.4
255	11/28/77	24	9.8	3.6	.4
256	11/28/77	21	9.8	3.3	.3
257	11/28/77	6	9.8	3.1	.3
258	11/28/77	3	9.8	.0	.0
259	11/28/77	7	9.8	.0	.0
260	11/28/77	12	9.8	.0	.0
261	11/28/77	15	9.8	.0	.0
262	11/28/77	20	9.8	.0	.0
263	11/28/77	23	9.8	.0	.0
264	11/28/77	33A	9.8	.0	.0
265	12/09/77	32	9.7	12.1	1.2
266	12/09/77	13	9.7	11.1	1.1
267	12/09/77	1	9.7	9.0	.9
268	12/09/77	9	9.7	7.9	.8
269	12/09/77	7	9.7	7.8	.8
270	12/09/77	19	9.7	7.6	.8
271	12/09/77	14	9.7	7.1	.7
272	12/09/77	20	9.7	6.9	.7
273	12/09/77	17	9.7	6.3	.6
274	12/09/77	22	9.7	6.2	.6
275	12/09/77	15	9.7	6.2	.6
276	12/09/77	25	9.7	6.1	.6
277	12/09/77	23	9.7	6.0	.6
278	12/09/77	18	9.7	5.8	.6
279	12/09/77	33B	9.7	5.6	.6
280	12/09/77	12	9.7	5.3	.5
281	12/09/77	4	9.7	5.1	.5
282	12/09/77	5	9.7	5.0	.5
283	12/09/77	6	9.7	4.9	.5
284	12/09/77	16	9.7	4.9	.5
285	12/09/77	29B	9.7	4.4	.4
286	12/09/77	28B	9.7	4.2	.4
287	12/09/77	8	9.7	4.1	.4
288	12/09/77	26	9.7	4.0	.4
289	12/09/77	30B	9.7	4.0	.4
290	12/09/77	21	9.7	3.7	.4
291	12/09/77	27B	9.7	3.6	.4
292	12/09/77	3	9.7	3.5	.4
293	12/09/77	24	9.7	3.5	.4
294	12/09/77	2	9.7	.0	.0
295	12/09/77	11	9.7	.0	.0
296	12/09/77	31B	9.7	.0	.0
297	12/09/77	32B	9.7	.0	.0
298	11/25/77	32	8.8	16.2	1.8
299	11/25/77	17	8.8	13.6	1.5
300	11/25/77	8	8.8	13.0	1.5
301	11/25/77	18	8.8	12.1	1.4

Record No.	Date	Site	AVS1/	AVC2/	Ratio AVC/AVS
302	11/25/77	10A	8.8	11.6	1.3
303	11/25/77	20	8.8	11.3	1.3
304	11/25/77	14	8.8	11.2	1.3
305	11/25/77	30A	8.8	11.0	1.2
306	11/25/77	5	8.8	10.7	1.2
307	11/25/77	19	8.8	10.2	1.2
308	11/25/77	23	8.8	9.4	1.1
309	11/25/77	11	8.8	9.1	1.0
310	11/25/77	22	8.8	9.1	1.0
311	11/25/77	25	8.8	9.0	1.0
312	11/25/77	2	8.8	9.0	1.0
313	11/25/77	12	8.8	8.6	1.0
314	11/25/77	1	8.8	8.6	1.0
315	11/25/77	6	8.8	8.6	1.0
316	11/25/77	26	8.8	8.6	1.0
317	11/25/77	16	8.8	8.5	1.0
318	11/25/77	21	8.8	8.1	.9
319	11/25/77	24	8.8	6.8	.8
320	11/25/77	29A	8.8	6.4	.7
321	11/25/77	4	8.8	5.9	.7
322	11/25/77	27A	8.8	5.6	.6
323	11/25/77	3	8.8	4.8	.5
324	11/25/77	7	8.8	.0	.0
325	11/25/77	9	8.8	.0	.0
326	11/25/77	13	8.8	.0	.0
327	11/25/77	15	8.8	.0	.0
328	11/25/77	28A	8.8	.0	.0
329	11/25/77	31A	8.8	.0	.0
330	11/25/77	33A	8.8	.0	.0
331	11/29/77	1	8.3	11.0	1.3
332	11/29/77	13	8.3	10.4	1.2
333	11/29/77	32	8.3	10.3	1.2
334	11/29/77	10A	8.3	9.6	1.2
335	11/29/77	33A	8.3	9.5	1.1
336	11/29/77	9	8.3	9.1	1.1
337	11/29/77	30A	8.3	8.3	1.0
338	11/29/77	28A	8.3	8.0	1.0
339	11/29/77	8	8.3	8.0	1.0
340	11/29/77	20	8.3	7.8	.9
341	11/29/77	18	8.3	7.8	.9
342	11/29/77	31A	8.3	7.5	.9
343	11/29/77	19	8.3	7.4	.9
344	11/29/77	14	8.3	7.1	.9
345	11/29/77	25	8.3	7.1	.8
346	11/29/77	22	8.3	6.9	.8
347	11/29/77	11	8.3	6.8	.8
348	11/29/77	5	8.3	6.7	.8
349	11/29/77	26	8.3	6.3	.8
350	11/29/77	23	8.3	5.8	.7
351	11/29/77	4	8.3	5.4	.6
352	11/29/77	6	8.3	5.3	.6
353	11/29/77	29A	8.3	5.2	.6
354	11/29/77	2	8.3	4.5	.5
355	11/29/77	27A	8.3	4.5	.5
356	11/29/77	21	8.3	4.1	.5
357	11/29/77	24	8.3	3.8	.5
358	11/29/77	3	8.3	2.5	.3
359	11/29/77	7	8.3	.0	.0
360	11/29/77	12	8.3	.0	.0

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AVS - Eight-hour average (10 AM-6 PM) carbon monoxide at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average (10 AM-6 PM) at the study site.

TABLE D-3 contd.

Record No.	Date	Site	AVS[1/]	AVC[2/]	Ratio AVC/AVS
361	11/29/77	15	8.3	.0	.0
362	11/29/77	16	8.3	.0	.0
363	11/29/77	17	8.3	.0	.0
364	12/08/77	13	7.6	9.4	1.2
365	12/08/77	32	7.6	8.7	1.1
366	12/08/77	33A	7.6	8.6	1.1
367	12/06/77	10A	7.6	8.0	1.1
368	12/08/77	30A	7.6	7.8	1.0
369	12/08/77	1	7.6	7.5	1.0
370	12/08/77	16	7.6	6.4	.8
371	12/08/77	9	7.6	6.2	.8
372	12/08/77	5	7.6	5.7	.7
373	12/08/77	18	7.6	5.6	.7
374	12/08/77	20	7.6	5.2	.7
375	12/08/77	8	7.6	5.0	.7
376	12/08/77	12	7.6	5.0	.7
377	12/08/77	14	7.6	4.9	.6
378	12/08/77	25	7.6	4.9	.6
379	12/08/77	31A	7.6	4.9	.6
380	12/08/77	17	7.6	4.7	.6
391	12/08/77	19	7.6	4.7	.6
382	12/08/77	23	7.6	4.2	.6
383	12/08/77	11	7.6	4.1	.5
364	12/08/77	22	7.6	4.0	.5
385	12/08/77	29A	7.6	3.7	.5
386	12/08/77	26	7.6	3.5	.5
387	12/08/77	4	7.6	3.3	.4
388	12/08/77	6	7.6	3.3	.4
389	12/08/77	21	7.6	3.2	.4
390	12/08/77	15	7.6	3.1	.4
391	12/08/77	28A	7.6	3.1	.4
392	12/08/77	24	7.6	2.6	.3
393	12/08/77	3	7.6	1.8	.2
394	12/08/77	27A	7.6	1.8	.2
395	12/08/77	2	7.6	.0	.0
396	12/08/77	7	7.6	.0	.0
397	12/07/77	32	6.4	8.7	1.4
398	12/07/77	33A	6.4	6.8	1.1
399	12/07/77	13	6.4	6.5	1.0
400	12/07/77	18	6.4	6.4	1.0
401	12/07/77	19	6.4	6.2	1.0
402	12/07/77	14	6.4	4.7	.7
403	12/07/77	10A	6.4	4.6	.7
404	12/07/77	1	6.4	4.6	.7
405	12/07/77	8	6.4	4.5	.7
406	12/07/77	7	6.4	4.4	.7
407	12/07/77	2	6.4	4.3	.7
408	12/07/77	23	6.4	4.1	.6
409	12/07/77	12	6.4	3.8	.6
410	12/07/77	25	6.4	3.8	.6
411	12/07/77	16	6.4	3.7	.6
412	12/07/77	5	6.4	3.6	.6
413	12/07/77	30A	6.4	3.6	.6
414	12/07/77	20	6.4	3.0	.5
415	12/07/77	26	6.4	2.6	.4
416	12/07/77	4	6.4	2.6	.4
417	12/07/77	28A	6.4	2.5	.4
418	12/07/77	29A	6.4	2.2	.3
419	12/07/77	22	6.4	2.1	.3
420	12/07/77	21	6.4	2.0	.3
421	12/07/77	11	6.4	2.0	.3
422	12/07/77	6	6.4	1.8	.3
423	12/07/77	15	6.4	1.8	.3
424	12/07/77	3	6.4	1.4	.2
425	12/07/77	24	6.4	1.1	.2
426	12/07/77	27A	6.4	1.1	.2
427	12/07/77	9	6.4	.0	.0
428	12/07/77	17	6.4	.0	.0
429	12/07/77	31A	6.4	.0	.0
430	12/06/77	11	6.2	13.3	2.2
431	12/06/77	10A	6.2	13.0	2.1
432	12/06/77	1	6.2	12.4	2.0
433	12/06/77	9	6.2	11.9	1.9
434	12/06/77	20	6.2	11.5	1.9
435	12/06/77	32	6.2	11.1	1.8
436	12/06/77	25	6.2	11.0	1.8
437	12/06/77	18	6.2	10.4	1.7
438	12/06/77	17	6.2	10.2	1.6
439	12/06/77	6	6.2	9.4	1.5
440	12/06/77	24	6.2	9.1	1.5
441	12/06/77	23	6.2	8.9	1.4
442	12/06/77	29A	6.2	8.5	1.4
443	12/06/77	5	6.2	8.1	1.3
444	12/06/77	21	6.2	8.0	1.3
445	12/06/77	19	6.2	8.0	1.3
446	12/06/77	7	6.2	7.8	1.3
447	12/06/77	28A	6.2	7.6	1.2
448	12/06/77	22	6.2	7.6	1.2
449	12/06/77	13	6.2	7.2	1.2
450	12/06/77	27A	6.2	7.2	1.2
451	12/06/77	14	6.2	7.1	1.1
452	12/06/77	30A	6.2	7.0	1.1
453	12/06/77	12	6.2	6.5	1.1
454	12/06/77	31A	6.2	6.3	1.0
455	12/06/77	16	6.2	6.1	1.0
456	12/06/77	4	6.2	6.0	1.0
457	12/06/77	26	6.2	5.0	.8
458	12/06/77	15	6.2	4.1	.7
459	12/06/77	2	6.2	2.6	.4
460	12/06/77	3	6.2	2.4	.4
461	12/06/77	8	6.2	.0	.0
462	12/06/77	33A	6.2	.0	.0
463	12/16/77	32	6.0	11.0	1.8
464	12/16/77	18	6.0	8.5	1.4
465	12/16/77	1	6.0	8.2	1.4
466	12/16/77	11	6.0	7.2	1.2
467	12/16/77	8	6.0	7.1	1.2
468	12/16/77	7	6.0	7.0	1.2
469	12/16/77	13	6.0	6.6	1.1
470	12/16/77	33B	6.0	6.5	1.1
471	12/16/77	14	6.0	6.1	1.0
472	12/16/77	19	6.0	6.0	1.0
473	12/16/77	17	6.0	5.5	.9
474	12/16/77	5	6.0	5.4	.9
475	12/16/77	6	6.0	5.4	.9
476	12/16/77	9	6.0	5.3	.9
477	12/16/77	23	6.0	5.2	.9
478	12/16/77	4	6.0	5.0	.8
479	12/16/77	20	6.0	4.7	.8
480	12/16/77	32B	6.0	4.6	.8

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AVS - Eight-hour average (10 AM-6 PM) carbon monoxide at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average (10 AM-6 PM) at the study site.

TABLE D-3 contd.

Record No.	Date	Site	AVS[1]	AVC[2]	Ratio AVC/AVS
481	12/16/77	24	6.0	4.5	.7
482	12/16/77	25	6.0	4.2	.7
483	12/16/77	31B	6.0	4.1	.7
484	12/16/77	22	6.0	4.0	.7
485	12/16/77	30B	6.0	4.0	.7
486	12/16/77	2	6.0	3.5	.6
487	12/16/77	26	6.0	3.4	.6
488	12/16/77	29B	6.0	3.3	.5
489	12/16/77	12	6.0	3.1	.5
490	12/16/77	15	6.0	3.1	.5
491	12/16/77	16	6.0	3.0	.5
492	12/16/77	21	6.0	3.0	.5
493	12/16/77	28B	6.0	3.0	.5
494	12/16/77	27B	6.0	1.7	.3
495	12/16/77	3	6.0	1.2	.2
496	12/12/77	1	5.2	11.1	2.1
497	12/12/77	9	5.2	10.9	2.1
498	12/12/77	11	5.2	9.9	1.9
499	12/12/77	32B	5.2	9.7	1.9
500	12/12/77	32	5.2	9.7	1.9
501	12/12/77	18	5.2	9.3	1.8
502	12/12/77	20	5.2	9.0	1.7
503	12/12/77	7	5.2	8.1	1.6
504	12/12/77	8	5.2	8.1	1.6
505	12/12/77	23	5.2	7.8	1.5
506	12/12/77	22	5.2	7.1	1.4
507	12/12/77	5	5.2	7.0	1.3
508	12/12/77	4	5.2	6.9	1.3
509	12/12/77	24	5.2	6.4	1.2
510	12/12/77	25	5.2	6.4	1.2
511	12/12/77	13	5.2	6.3	1.2
512	12/12/77	14	5.2	6.3	1.2
513	12/12/77	21	5.2	6.0	1.2
514	12/12/77	12	5.2	6.0	1.2
515	12/12/77	19	5.2	6.0	1.2
516	12/12/77	15	5.2	5.9	1.1
517	12/12/77	31B	5.2	5.7	1.1
518	12/12/77	16	5.2	5.7	1.1
519	12/12/77	17	5.2	5.7	1.1
520	12/12/77	29B	5.2	5.4	1.0
521	12/12/77	33B	5.2	5.4	1.0
522	12/12/77	28B	5.2	5.0	1.0
523	12/12/77	26	5.2	4.7	.9
524	12/12/77	30B	5.2	4.6	.9
525	12/12/77	27B	5.2	3.8	.7
526	12/12/77	2	5.2	3.6	.7
527	12/12/77	3	5.2	1.2	.2
528	12/12/77	6	5.2	.0	.0
529	12/20/77	11	4.1	10.1	2.4
530	12/20/77	20	4.1	10.1	2.4
531	12/20/77	1	4.1	8.8	2.1
532	12/20/77	9	4.1	8.4	2.0
533	12/20/77	32	4.1	7.4	1.8
534	12/20/77	33B	4.1	7.2	1.7
535	12/20/77	18	4.1	7.0	1.7
536	12/20/77	6	4.1	6.2	1.5
537	12/20/77	28B	4.1	6.1	1.5
538	12/20/77	24	4.1	6.0	1.5
539	12/20/77	17	4.1	5.9	1.4
540	12/20/77	23	4.1	5.7	1.4
541	12/20/77	25	4.1	5.7	1.4
542	12/20/77	29B	4.1	4.7	1.1
543	12/20/77	4	4.1	4.5	1.1
544	12/20/77	26	4.1	4.2	1.0
545	12/20/77	5	4.1	4.1	1.0
546	12/20/77	21	4.1	4.1	1.0
547	12/20/77	13	4.1	4.1	1.0
548	12/20/77	12	4.1	4.0	1.0
549	12/20/77	22	4.1	3.9	.9
550	12/20/77	15	4.1	3.6	.9
551	12/20/77	32B	4.1	3.0	.7
552	12/20/77	19	4.1	3.0	.7
553	12/20/77	2	4.1	2.7	.7
554	12/20/77	16	4.1	2.7	.7
555	12/20/77	27B	4.1	2.7	.6
556	12/20/77	30B	4.1	2.4	.6
557	12/20/77	3	4.1	1.5	.4
558	12/20/77	7	4.1	.0	.0
559	12/20/77	8	4.1	.0	.0
560	12/20/77	14	4.1	.0	.0
561	12/20/77	31B	4.1	.0	.0
562	12/14/77	11	4.0	11.9	3.0
563	12/14/77	1	4.0	10.4	2.6
564	12/14/77	18	4.0	9.4	2.3
565	12/14/77	20	4.0	9.1	2.3
566	12/14/77	9	4.0	9.1	2.3
567	12/14/77	26	4.0	8.4	2.1
568	12/14/77	33B	4.0	8.4	2.1
569	12/14/77	32	4.0	8.3	2.1
570	12/14/77	24	4.0	7.6	1.9
571	12/14/77	23	4.0	7.5	1.9
572	12/14/77	21	4.0	7.2	1.8
573	12/14/77	17	4.0	6.7	1.7
574	12/14/77	6	4.0	6.5	1.6
575	12/14/77	28B	4.0	6.4	1.6
576	12/14/77	7	4.0	6.1	1.5
577	12/14/77	19	4.0	6.1	1.5
578	12/14/77	22	4.0	6.0	1.5
579	12/14/77	30B	4.0	6.0	1.5
580	12/14/77	4	4.0	5.7	1.4
581	12/14/77	31B	4.0	4.9	1.2
582	12/14/77	29B	4.0	4.7	1.2
583	12/14/77	12	4.0	4.6	1.2
584	12/14/77	14	4.0	4.6	1.1
585	12/14/77	13	4.0	3.9	1.0
586	12/14/77	27B	4.0	3.5	.9
587	12/14/77	5	4.0	2.7	.7
588	12/14/77	16	4.0	2.4	.6
589	12/14/77	15	4.0	2.4	.6
590	12/14/77	3	4.0	1.3	.3
591	12/14/77	2	4.0	.0	.0
592	12/14/77	8	4.0	.0	.0
593	12/14/77	25	4.0	.0	.0
594	12/14/77	32B	4.0	.0	.0
595	12/13/77	11	1.3	9.8	7.8
596	12/13/77	18	1.3	5.7	4.5
597	12/13/77	32B	1.3	4.6	3.7
598	12/13/77	33B	1.3	4.5	3.6
599	12/13/77	23	1.3	4.4	3.5
600	12/13/77	21	1.3	4.3	3.4

NOTE: Zeroes indicate no valid data and were omitted from calculations.

[1] AVS - Eight-hour average (10 AM-6 PM) carbon monoxide at the permanent monitor, 115 1/2 Ninth Street.

[2] AVC - Eight-hour average (10 AM-6 PM) at the study site.

TABLE D-3 contd.

Record No.	Date	Site	AVS[1/]	AVC[2/]	Ratio AVC/AVS
601	12/13/77	1	1.3	4.1	3.3
602	12/13/77	6	1.3	4.1	3.3
603	12/13/77	32	1.3	4.0	3.2
604	12/13/77	20	1.3	3.8	3.0
605	12/13/77	24	1.3	3.2	2.6
606	12/13/77	17	1.3	3.2	2.6
607	12/13/77	25	1.3	3.1	2.5
608	12/13/77	22	1.3	2.9	2.3
609	12/13/77	19	1.3	2.9	2.3
610	12/13/77	7	1.3	2.8	2.2
611	12/13/77	13	1.3	2.7	2.2
612	12/13/77	12	1.3	2.7	2.1
613	12/13/77	29B	1.3	2.5	2.0
614	12/13/77	26	1.3	2.5	2.0
615	12/13/77	14	1.3	2.4	1.9
616	12/13/77	30B	1.3	2.4	1.9
617	12/13/77	4	1.3	2.4	1.9
618	12/13/77	31B	1.3	2.1	1.7
619	12/13/77	5	1.3	1.5	1.2
620	12/13/77	16	1.3	1.3	1.0
621	12/13/77	2	1.3	1.2	1.0
622	12/13/77	27B	1.3	1.2	1.0
623	12/13/77	15	1.3	1.1	.8
624	12/13/77	3	1.3	.7	.5
625	12/13/77	8	1.3	.0	.0
626	12/13/77	9	1.3	.0	.0
627	12/13/77	28B	1.3	.0	.0
628	12/01/77	23	.0	13.0	.0
629	12/01/77	11	.0	12.9	.0
630	12/01/77	1	.0	11.6	.0
631	12/01/77	20	.0	11.0	.0
632	12/01/77	18	.0	10.8	.0
633	12/01/77	9	.0	9.3	.0
634	12/01/77	25	.0	9.0	.0
635	12/01/77	21	.0	8.4	.0
636	12/01/77	17	.0	8.3	.0
637	12/01/77	10A	.0	7.9	.0
638	12/01/77	24	.0	7.6	.0
639	12/01/77	30A	.0	6.6	.0
640	12/01/77	14	.0	6.6	.0
641	12/01/77	32	.0	6.4	.0
642	12/01/77	19	.0	5.9	.0
643	12/01/77	28A	.0	5.9	.0
644	12/01/77	22	.0	5.8	.0
645	12/01/77	8	.0	5.6	.0
646	12/01/77	26	.0	5.5	.0
647	12/01/77	29A	.0	5.4	.0
648	12/01/77	27A	.0	5.4	.0
649	12/01/77	4	.0	5.1	.0
650	12/01/77	31A	.0	5.0	.0
651	12/01/77	7	.0	5.0	.0
652	12/01/77	5	.0	4.5	.0
653	12/01/77	16	.0	4.2	.0
654	12/01/77	15	.0	4.1	.0
655	12/01/77	33A	.0	4.1	.0
656	12/01/77	13	.0	4.1	.0
657	12/01/77	12	.0	4.0	.0
658	12/01/77	2	.0	1.5	.0
659	12/01/77	3	.0	1.5	.0
660	12/01/77	6	.0	.0	.0

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ AVS - Eight-hour average (10 AM - 6 PM) carbon monoxide at the permanent monitor, 115 1/2 Ninth Street.

2/ AVC - Eight-hour average (10 AM - 6 PM) at the study site.

TABLE D-4. Ratios Greater Than 1.5 for an Eight-Hour Average Greater Than 9.0 ppm at the Study Site (CO in ppm)

Record No.	Date	Site	AVC1/	AVS2/	Ratio AVC/AVS
7	12/06/77	1	12.4	6.2	2.0
11	12/12/77	1	11.1	5.2	2.1
13	12/14/77	1	10.4	4.0	2.6
98	12/06/77	6	9.4	6.2	1.5
121	11/25/77	8	13.0	8.0	1.6
137	12/06/77	9	11.9	6.2	1.9
140	12/12/77	9	10.9	5.2	2.1
141	12/14/77	9	9.1	4.0	2.3
152	12/02/77	10	15.9	10.5	1.5
154	12/06/77	10	13.0	6.2	2.1
162	12/06/77	11	13.3	6.2	2.1
165	12/12/77	11	9.9	5.2	1.9
166	12/13/77	11	9.8	1.3	7.8
167	12/14/77	11	11.9	4.0	3.0
171	12/20/77	11	10.1	4.2	2.4
257	11/25/77	17	13.6	8.0	1.7
261	12/06/77	17	10.2	6.2	1.6
272	11/25/77	18	12.1	8.0	1.5
277	12/06/77	18	10.4	6.2	1.7
281	12/12/77	18	9.3	5.2	1.8
283	12/14/77	18	9.4	4.0	2.3
314	12/06/77	20	11.5	6.2	1.9
320	12/14/77	20	9.1	4.0	2.3
324	12/20/77	20	10.1	4.2	2.4
406	12/06/77	25	11.0	6.2	1.8
444	11/25/77	32	16.2	8.0	2.0
448	12/02/77	32	16.5	10.5	1.6
450	12/06/77	32	11.1	6.2	1.8
454	12/12/77	32	9.7	5.2	1.9
458	12/16/77	32	11.0	6.0	1.8
550	12/12/77	32B	9.7	6.2	1.9

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1/ AVC - Eight-hour (10 AM - 6 PM) average carbon monoxide at study site.

2/ AVS - Eight-hour (10 AM - 6 PM) average carbon monoxide at permanent monitor, 115½ Ninth Street.

TABLE D-5a. Mean Ratios (AVC/AVS) Greater Than 1.2

Site	Mean Ratio	No. Records
1	1.4	19
11	1.5	17
18	1.3	18
32	1.5	19
32B	1.3	7

TABLE D-5b. Mean Ratios (AVC/AVS) Less Than 0.8

Site	Mean Ratio	No. Records
2	0.6	16
3	0.3	18
4	0.7	19
15	0.6	15
16	0.7	18
27A	0.5	9
27B	0.5	10
28A	0.7	8
28B	0.7	9
29A	0.6	9
30B	0.7	10

TABLE D-5c. Mean Ratios (AVC/AVS) GE[1] 0.8 but LE[2] 1.2

Site	Mean Ratio	No. of Records
5	0.9	19
6	0.9	18
7	1.1	11
8	0.9	11
9	1.1	16
10A	1.2	9
12	0.8	16
13	1.1	17
14	0.9	17
17	1.1	15
19	1.0	19
20	1.2	18
21	0.8	19
22	0.8	19
23	1.1	16
24	0.8	19
25	0.9	18
26	0.8	19
29B	0.8	10
30A	1.0	9
31A	0.8	7
31B	0.8	8
33A	1.1	5
33B	1.2	10

1/ GE - Greater Than or equal to

2/ LE - Less Than or equal to

TABLE D-6. Mean of all Ratios[1] of Eight-Hour Averages Each Day

1977 Date	Mean Ratio	No of Records	AVS[2]
11/25	1.1	26	8.8
28	0.6	26	9.8
29	0.8	28	8.3
30	0.6	30	10.7
12/01	-	-	-
02	1.1	29	10.5
05	0.7	27	9.9
06	1.3	31	6.2
07	0.6	30	6.4
08	0.7	31	7.6
09	0.6	29	9.7
12	1.3	32	5.2
13	2.5	30	1.3
14	1.6	29	4.0
15	0.4	32	10.7
16	0.8	33	6.0
19	0.5	31	10.8
20	1.2	29	4.1
21	0.6	32	10.2
22	0.6	31	13.7

[1] Ratio of eight-hour average (10 AM - 6 PM) at the site to that at the permanent monitor.

[2] AVS - Eight-hour average (10 AM - 6 PM) at the permanent monitor.

TABLE D-7. Data From the Permanent Monitor at 115 1/2 Ninth Street (CO in ppm)

Record No	Date	Site	HR11 1/	HR12	HR13	HR14	HR15	HR16	HR17	HR18	AMC 2/	PMC 3/	AVS 4/
1	11/25/77	ODD	14.4	11.7	9.0	9.9	8.1	4.0	2.7	10.8	11.3	6.4	8.8
2	11/28/77	ODD	8.2	9.1	9.5	9.1	10.0	10.4	9.5	12.7	9.0	10.6	9.8
3	11/29/77	ODD	5.6	2.8	9.8	10.3	7.4	6.0	9.3	15.4	7.1	9.5	8.3
4	11/30/77	ODD	11.7	9.8	7.4	7.0	5.1	6.5	15.4	22.9	9.0	12.5	10.7
5	12/01/77	ODD	.0	.0	.0	1.4	2.0	2.5	4.9	4.5	.0	3.5	.0
6	12/02/77	ODD	11.8	12.2	6.3	7.7	10.4	9.1	15.4	10.9	9.5	11.5	10.5
7	12/05/77	ODD	6.8	12.7	9.1	8.2	6.8	9.1	14.5	11.8	9.2	10.6	9.9
8	12/06/77	ODD	4.1	5.0	8.2	5.4	6.3	8.2	5.4	6.8	5.7	6.7	6.2
9	12/07/77	ODD	10.0	7.7	5.0	5.9	5.0	4.1	6.3	7.2	7.2	5.7	6.4
10	12/08/77	ODD	1.8	7.2	7.7	7.7	7.7	7.2	8.6	12.7	6.1	9.1	7.6
11	12/09/77	ODD	8.3	10.0	11.4	8.5	7.9	6.9	14.3	10.5	9.6	9.9	9.7
12	12/12/77	ODD	6.3	3.6	2.3	4.1	7.8	4.2	5.1	7.9	4.1	6.3	5.2
13	12/13/77	ODD	.9	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.3	1.3
14	12/14/77	ODD	4.5	8.1	5.4	3.6	1.8	1.8	1.8	4.9	5.4	2.6	4.0
15	12/15/77	ODD	10.3	12.1	7.2	5.4	11.2	17.1	12.6	9.9	8.8	12.7	10.7
16	12/16/77	ODD	8.1	8.1	8.1	5.8	5.4	3.6	4.5	4.5	7.5	4.5	6.0
17	12/19/77	ODD	3.1	8.1	9.9	12.1	10.8	10.3	12.6	19.3	8.3	13.3	10.8
18	12/20/77	ODD	2.2	8.1	8.1	2.7	3.1	3.6	1.3	4.0	5.3	3.0	4.1
19	12/21/77	ODD	7.2	8.1	11.7	8.5	9.0	6.3	10.8	19.8	8.9	11.5	10.2
20	12/22/77	ODD	11.0	12.8	13.7	11.9	11.0	11.0	15.6	22.9	12.4	15.1	13.7

NOTE: Zeroes indicate no valid data and were omitted from calculations.

1/ Hourly average of NDIR measurements for the hour ending at 11:00 a.m.

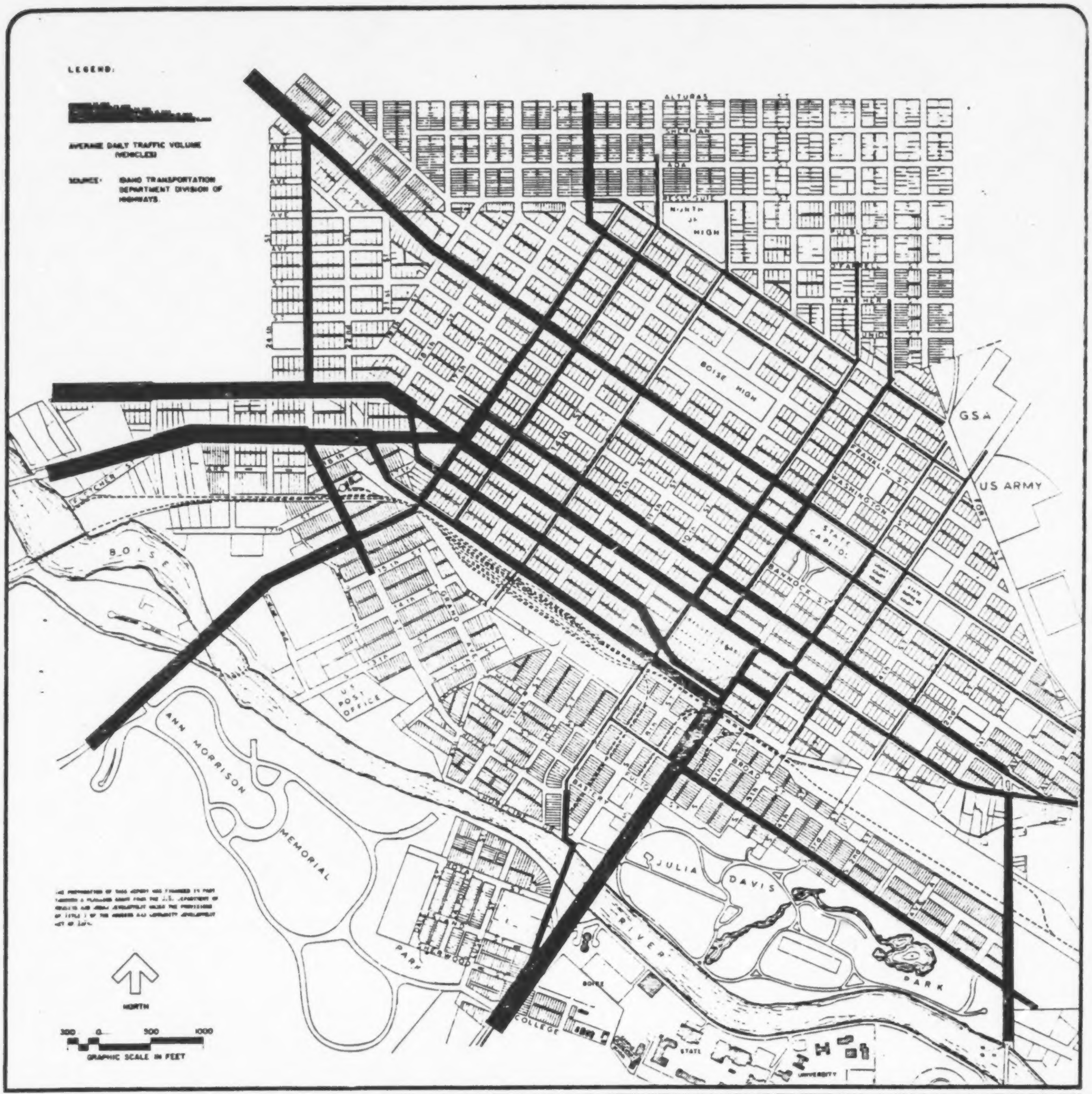
2/ AMC - Four-hour average for 10 AM to 2 PM.

3/ PMC - Four-hour average for 2 PM to 6 PM.

4/ AVS - Eight-hour average for 10 AM to 6 PM.

APPENDIX E

TRAFFIC FLOW MAP


LEGEND:
AVERAGE DAILY TRAFFIC VOLUME (VEHICLES)
SOURCE: IDAHO TRANSPORTATION DEPARTMENT DIVISION OF HIGHWAYS.
ALTURAS
SHERMAN
NINTH JR HIGH
BOISE HIGH
GSA
US ARMY
FRANKLIN ST
WASHINGTON
STATE CAPITOL
BANNOCK ST
U.S. POST OFFICE
BOISE
ANN MORRISON
MEMORIAL
PARK
JULIA
DAVIS
PARK
RIVER
COLLEGE
STATE
UNIVERSITY
NORTH
300 0 500 1000
GRAPHIC SCALE IN FEET

RECENT TRAFFIC VOLUME DATA

CITY CENTER STUDY - BOISE, IDAHO.

PEAT, MARWICK, MITCHELL & CO. AND DIVERSIFIED PLANNING, LTD.
ADA PLANNING ASSOCIATION

DECEMBER 1976

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APPENDIX E

APPENDIX F

INDOOR SITE DATA

APPENDIX F

Indoor Site Data

Table Page

F-1 Boise CO Survey/Indoor Tape-Indoor Bag-Corresponding Outdoor Site Comparisons

Site BIN1 .... F-1

Site BIN2 .... F-2

Site BIN3 .... F-3

Site BIN4 .... F-3

Site BIN5 .... F-4

Site BIN6 .... F-5

Table F-1. Boise CO Survey/Indoor Tape - Indoor Bag - Corresponding Outdoor Site Comparisons

(Results in ppm of Carbon Monoxide)

Indoor Site BIN1: Main & 10th (Idanha Hotel)

1977 DATE	Indoor Tape 4-Hr Ave AM	Indoor Bag 4-Hr Ave AM	Site 14 4-Hr Ave AM	Indoor Tape 4-Hr Ave PM	Indoor Bag 4-Hr Ave PM	Site 14 4-Hr Ave PM	Indoor Tape 8-Hr Ave	Indoor Bag 8-Hr Ave	Site 14 8-Hr Ave
11/23	--	--	--	(8.5)^{2}*	--	--	--	--	--
11/25	(8.5)^{2}*	7.0	12.1	11.2	9.0	10.2	--	8.0	11.2
11/28	(4.2)^{1}	6.5	4.0	4.5	5.1	3.2	(4.3)^{1}	5.8	3.6
11/29	7.5	--	8.4	4.4	--	5.8	5.8	--	7.1
11/30	6.4	7.0	7.0	3.7	4.1	7.1	5.0	5.6	7.0
12/1	6.7*	5.0	5.0	6.9	7.3	8.1	6.8*	6.1	6.6
12/2	8.1*	8.5	4.2	(11.5)^{3}	11.5	11.5	(8.8)^{3}*	10.0	7.8

NOTES: Superscript numbers represent the number of hours of data missing from the average.
Averages in parentheses were omitted from further calculations due to incomplete data.
* - 10 to 30 minutes missing in one hourly average which was used for computing the AM, PM, or 8-hour average.
AM - 10 AM to 2 PM period
PM - 2 PM to 6 PM period
8-Hr. Ave. - Average of AM and PM data

Table F-1 (continued)

Indoor Site BIN2: 130 E. Bannock (St. Luke's Hospital)

1977 DATE	Indoor Tape 4-Hr Ave AM	Indoor Bag 4-Hr Ave AM	Site 29A[a] 4-Hr Ave AM	Indoor Tape 4-Hr Ave PM	Indoor Bag 4-Hr Ave PM	Site 29A 4-Hr Ave PM	Indoor Tape 8-Hr Ave	Indoor Bag 8-Hr Ave	Site 29A 8-Hr Ave
11/23	2.1	--	--	1.8	--	--	2.0	--	--
11/25	2.7*	5.0	$(6.8)^1$	3.3*	2.0	$(5.9)^1$	3.0	3.5	(6.4)
11/28	2.4**	5.0	5.9	2.6	3.1	3.9	2.5	4.0	4.9
11/29	3.7	4.5	7.8	2.5*	2.9	2.6	3.1	3.7	5.2
11/30	4.5	6.0	8.9	$(2.8)^1$*	3.3	2.9	$(3.8)^1$	4.6	5.9
12/1	.2	1.9	4.1	--	3.1	6.7	--	2.5	5.4
12/2	2.8	3.9	9.0	(5.8)***	6.0	9.9	(4.1)***	5.0	9.4
12/5	$(2.8)^1$	3.0	5.2	2.6	3.2	2.5	$(2.7)^1$	3.1	3.8
12/6	9.1	--	7.0	--	--	9.9	--	--	8.4

NOTES: Superscript numbers represent the number of hours of data missing from the average.
Averages in parentheses were omitted from further calculations due to incomplete data.
* - 10 to 30 minutes missing in one hourly average which was used for computing the AM, PM, or 8-hour average.
** - 10 to 30 minutes missing in each of two hourly averages which were used for computing the AM, PM, or 8-hour average.
*** - 10 to 30 minutes missing in each of three hourly averages which were used for computing the AM, PM, or 8-hour average.
AM - 10 AM to 2 PM period
PM - 2 PM to 6 PM period
8-Hr. Ave. - Average of AM and PM data
a - Site 29A was moved from Bannock St. between 1st Ave. & "A" Ave. on the south side to 1st Ave. between Bannock and Idaho on the west side after 11/25/77.

Table F-1 (continued)

Indoor Site BIN3: Idaho and 9th (Sexty's Retail Jeweler's)+

1977 DATE	Indoor Tape 4-Hr Ave AM	Indoor Bag 4-Hr Ave AM	Site 11 4-Hr Ave AM	Indoor Tape 4-Hr Ave PM	Indoor Bag 4-Hr Ave PM	Site 11 4-Hr Ave PM	Indoor Tape 8-Hr Ave	Indoor Bag 8-Hr Ave	Site 11 8-Hr Ave
12/6	--	10.1	11.7	12.7*	11.5	14.9	--	10.8	13.3
12/7	2.8	2.9	2.0	2.0	2.0	1.9	2.4	2.4	2.0
12/8	--	6.0	4.1	--	4.9	4.1	--	5.4	4.1

Indoor Site BIN4: 109 North 9th Street (David's Fabric Store)

1977 DATE	Indoor Tape 4-Hr Ave AM	Indoor Bag 4-Hr Ave AM	Site 13 4-Hr Ave AM	Indoor Tape 4-Hr Ave PM	Indoor Bag 4-Hr Ave PM	Site 13 4-Hr Ave PM	Indoor Tape 8-Hr Ave	Indoor Bag 8-Hr Ave	Site 13 8-Hr Ave
12/5	5.2	--	10.0	7.2	--	--	6.4	--	--
12/6	--	5.1	6.6	--	6.7	7.8	--	5.8	7.2
12/7	--	2.2	6.6	--	6.3	6.3	--	4.2	6.5

NOTES: Superscript numbers represent the number of hours of data missing from the average.
Averages in parentheses were omitted from further calculations due to incomplete data.
AM - 10 AM to 2 PM period
PM - 2 PM to 6 PM period
8-Hr. Ave. - Average of AM and PM data
+ - Site was abandoned and data may be suspect because small acetylene torches were used nearby for jewelry repair.
* - 10 to 30 minutes missing in one hourly average which was used for computing the AM, PM, or 8-hour average.

Table F-1 (continued)

Indoor Site BIN5: 9th n/o Main (Singer's Sewing Store)

1977 DATE	Indoor Tape 4-Hr Ave AM	Indoor Bag 4-Hr Ave AM	Site 9 4-Hr Ave AM	Indoor Tape 4-Hr Ave PM	Indoor Bag 4-Hr Ave PM	Site 9 4-Hr Ave PM	Indoor Tape 8-Hr Ave	Indoor Bag 8-Hr Ave	Site 9 8-Hr Ave
12/12	--	11.1	10.1	--	10.5	11.6	--	10.8	10.9
12/13	--	2.8	3.0	--	3.0	--	--	2.9	--
12/14	--	5.0	10.0	--	7.9	8.1	--	6.4	9.1
12/15	4.2	4.1	5.8	5.6	5.7	6.6	4.9	4.9	6.2
12/16	--	4.2	5.0	(7.6)^2	7.0	5.6	--	5.6	5.3
12/19	--	6.0	5.9	--	5.4	6.4	--	5.7	6.2
12/20	(9.3)^3	6.9	7.0	--	6.8	9.7	--	6.8	8.4
12/21	(5.1)^2	4.9	6.0	(7.8)^2	6.7	8.3	--	5.8	7.2
12/22	--	7.0	8.1	--	8.3	8.1	--	7.7	8.1

NOTES: Superscript numbers represent the number of hours of data missing from the average.
Averages in parentheses were omitted from further calculations due to incomplete data.
AM - 10 AM to 2 PM period
PM - 2 PM to 6 PM period
8-Hr. Ave. - Average of AM and PM data

Table F-1 (continued)

Indoor Site BIN6: 100 North 8th (Falk's Department Store)

1977 DATE	Indoor Tape 4-Hr Ave AM	Indoor Bag 4-Hr Ave AM	Site 7 4-Hr Ave AM	Indoor Tape 4-Hr Ave PM	Indoor Bag 4-Hr Ave PM	Site 7 4-Hr Ave PM	Indoor Tape 8-Hr Ave	Indoor Bag 8-Hr Ave	Site 7 8-Hr Ave
12/9	--	--	7.5	--	--	8.0	--	--	7.8
12/12	--	10.1	7.8	(6.6)^{1}*	6.1	8.4	--	8.1	8.1
12/13	(2.1)^{1a}	1.8	1.9	2.2	2.1	3.7	(2.1)^{1}	2.0	2.8
12/14	4.4*	3.2	6.5	4.8	3.5	5.7	4.6*	4.0	6.1
12/15	6.0	5.9	5.7	6.1	5.8	5.8	6.0	6.0	5.8
12/16	5.4	4.9	4.8	5.1	4.9	9.1	5.2	5.0	7.0
12/19	(8.0)^{2}*	6.2	6.1	8.0	7.2	7.9	--	7.1	7.0
12/20	5.2*	6.0	--	4.8	5.1	6.3	5.0*	5.4	--
12/21	6.9*	6.5	--	8.6	8.5	9.1	7.8*	7.6	--
12/22	9.6	8.0	--	12.6	10.5	9.7	11.1	10.3	--

NOTES: Superscript numbers represent the number of hours of data missing from the average.
Averages in parentheses were omitted from further calculations due to incomplete data.
* - 10 to 30 minutes missing in one hourly average which was used for computing the AM, PM, or 8-hour average.
AM - 10 AM to 2 PM period
PM - 2 PM to 6 PM period
8-Hr. Ave. - Average of AM and PM data